

BLACK EMPRESS *by* JOHN RUSSELL FEARN

SEE
BACK
COVER

AMAZING STORIES

JANUARY
20c

AN
AMAZING
CONFESSION

"I, ROBOT"

by EANDO BINDER



GREAT
STORIES *by*

ED EARL REPP • STANTON A. COBLENTZ • WELLMAN



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NO- NOT ME. I'M NOT GOING TO WASTE MY TIME. SUCCESS IS JUST A MATTER OF LUCK AND I WASN'T BORN LUCKY.

BILL SAYS
"YES"
HE'S MAKING
GOOD MONEY
IN RADIO
NOW



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THANKS

OH BILL! I'M SO PROUD OF YOU. YOU'VE GONE AHEAD SO FAST IN RADIO

YES! I'VE GOT A GOOD JOB NOW AND A BRIGHT FUTURE. THANKS TO M.R.I. TRAINING

TOM SAID
"NO"
HE'S STILL WAITING FOR LUCK



BILL'S A SNAKE TO WASTE HIS TIME STUDYING RADIO AT HOME



SAME OLD GRIND -- SAME SKIMPY PAY ENVELOPE -- I'M JUST WHERE I WAS FIVE YEARS AGO

EVEN IF I A FAILURE, LUCKY LINE I'LL NEVER GET ANYWHERE

YOU'LL ALWAYS BE A FAILURE, TOM. UNLESS YOU DO SOMETHING ABOUT IT, KNOWING AND WAITING WON'T GET YOU ANYWHERE

I WILL TRAIN YOU AT HOME *in Spare Time* FOR A GOOD RADIO JOB



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J. E. SMITH, President, Dept. 32M, National Radio Institute, Washington, D. C.

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**JANUARY
1939**

**VOLUME 13
NUMBER 1**

AMAZING STORIES

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Cover painting by Robert Fuqua, depicting a scene from "I, Robot"
Illustrations by Robert Fuqua & Julien S. Krupa

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**AMAZING
STORIES**
January 1939

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Volume 13
Number 1

The Observatory

By THE Editor



ONE of the authors who is rapidly proving his right to the title of "topnotcher" is the increasingly popular Eando Binder. He's been with us a long time, but his star is still in the ascendency. To prove it, we are presenting this month a story with a real kick to it. And outside of being a corker of a yarn, it has a human angle that's all too true, in spite of our vaunted "civilization." How often have we beaten to earth a great man because we misunderstood him, or colored our judgment with passion, superstition, or just plain ignorance?

"I, Robot" is a story which brings this home to us in a powerful manner. Read this story and let a robot tell you what he thinks. And we believe you'll thrill to the "nobility" of the mechanical being called "monster."

In bringing to you John Russell Fearn's latest novelette, "Black Empress" we are presenting the type yarn that has made his name what it is. He has concocted a yarn that is a bit more amazing than our past few issues have portrayed, but from an angle that gives it intense interest. We only hope you won't hate Madge Cromwell too much.

Ed Earl Repp appears once more with "The Scientific Ghost." Ghosts may not have any place in science, but this ghost does. And how scientific detective John Hale tracks down the phantom who threatens to kill will fascinate you. This is a story of a ghost whose breath is colder than the grave, who makes scientific instruments give amazing readings, and whose power to kill is potent and thorough.

"Death in the Tubeway" heralds the return to our pages of an old favorite, Stanton A. Coblenz. And with this story, we come to an amazing coincidence. In presenting our back cover this month, we hit on the idea of a rocket train. Simultaneously we received this manuscript of a similar rocket train, and since our conceptions are so widely divergent, we feel that our readers will be interested in judging the respective merits of each system, and turning the bright light of constructive criticism on each. Thus, when you read this story, aside from the dramatic tale Coblenz has woven about a scientific figure you'll like, we suggest that you compare it with the back cover and give us your own opinions on the rocket train of the future.

Out in space there may be strange things that we can't even guess about before interplanetary travel becomes a fact. R. R. Winterbotham has envisioned one of these unknown things, quite

startling in concept, to be sure, but certainly fine material for a dramatic short story. You'll marvel at the tiny world Procrustes and its amazing presence in the void of space. "Interplanetary Graveyard" is a unique yarn with a new idea.

Another author who is building popularity for a distinct type of story, is Frederic Arnold Kummer, Jr. He is speedily achieving recognition as a master of space adventure, and he doesn't fall down with his latest "The Treasure on Asteroid X." We know you'll like the brand new scientific treatment he has injected into an old favorite subject among our readers, the interplanetary tale of adventure in space.

Lastly we come to a different story. This one doesn't deal with the modern science of the present and future, nor even of the science of the past. Its science is the oldest one, the science of man. "Battle in the Dawn" is the story of Hok and Oloana, who struggled against terrific odds in the dawn ages of Earth's history. For life itself they fought, and without knowing it, to lay the foundation of vitile heritage that has brought their race to mastery of a world. You'll thrill to the adventures, loves, hates, and sorrows of Hok and Oloana, first true man and woman.

OUR cover this month is a scene from Eando Binder's story "I, Robot." We feel that artist Robert Fuqua has given this cover something of his art that lives and breathes with the art of Eando Binder in the story itself. It is as though both agreed thoroughly, and secretly, both like their respective robots more than they care to admit.

BEHIND the scenes in AMAZING STORIES, we owe a great deal to artists Brad Pendleton, and Lou Merrell of our staff, for the artistic lettering and layouts of illustrations for our stories. Our readers are familiar with the work of Brad Pendleton in his "Riddles of Science."

IT would seem that Noah had a tough job on his hands when he undertook to build the ark. According to Professor James Orr, editor-in-chief of the International Bible Encyclopedia, it took 120 years to finish the job. This is interesting to us because the significance of the time element becomes evident when we consider that Noah had some sort of "warning" of the coming flood.

Now, such long range weather forecasting is in
(Continued on page 126)

Mr. Mattingly & Mr. Moore tip you off to a great brand



"Oh, Mr. Mattingly,
Oh, Mr. Mattingly,
Lend an ear before you
tussle with that steer:



"I have heard, from coast to prairie,
That our mellow whiskey's very,
Very much the brand the
whiskey-wise want here!"



"Yes, Mr. Moore,
Yes, Mr. Moore,
Slow-distilling's been our
pride for many years;



"So M & M, my cowboy cronny,
As a long drink or a pony,
Is real splendiferous whiskey, at a
price that calls for cheers."

You could search far and wide
without coming across a whiskey
value to equal Mattingly & Moore.

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... every drop slow-distilled.

Furthermore, it's a blend of

straight whiskeys—which makes
the kind of whiskey we believe is
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"I, ROBOT"

Adam Link, the robot creation of Dr. Link, was as human as environment could make him. The power of thought was his, but when he tried to take his place in the world of men . . . the amazing confession of a mechanical man

CHAPTER I

My Creation

MUCH of what has occurred puzzles me. But I think I am beginning to understand now. You call me a monster, but you are wrong. Utterly wrong!

I will try to prove it to you, in writing. I hope I have time to finish—

I will begin at the beginning. I was born, or created, six months ago, on November 3 of last year. I am a true robot. So many of you seem to have doubts. I am made of wires and wheels, not flesh and blood.

My first recollection of consciousness was a feeling of being chained, and I was. For three days before that, I had been seeing and hearing, but all in a jumble. Now, I had the urge to arise and peer more closely at the strange, moving form that I had seen so many times before me, making sounds.

The moving form was Dr. Link, my creator. He was the only thing that moved, of all the objects within my sight. He and one other object—his dog Terry. Therefore these two objects held my interest more. I hadn't yet learned to associate movement with life.

But on this fourth day, I wanted to



by Eando Binder



"I raised the floorboards, and in a short time had substituted batteries."

approach the two moving shapes and make noises at them. Particularly at the smaller one. His noises were challenging, stirring. They made me want to rise and quiet them. But I was chained. I was held down by them so that, in my blank state of mind, I wouldn't wander off and bring myself to an untimely end, or harm someone unknowingly.

These things, of course, Dr. Link explained to me later, when I could dissociate my thoughts and understand. I was just like a baby for those three days—a human baby. I am not as other so-called robots were—mere automatized machines designed to obey certain commands or arranged stimuli.

No, I was equipped with a pseudo-brain that could receive *all* stimuli that human brains could. And with possibilities of eventually learning to rationalize for itself.

But for three days Dr. Link was very anxious about my brain. I was like a human baby and yet I was also like a sensitive, but unorganized, machine, subject to the whim of mechanical chance. My eyes turned when a bit of paper fluttered to the floor. But photoelectric cells had been made before capable of doing the same. My mechanical ears turned to best receive sounds from a certain direction, but any scientist could duplicate that trick with sonic-relays.

The question was—did my brain, to which the eyes and ears were connected, hold on to these various impressions for future use? Did I have, in short—*memory*?

THREE days I was like a newborn baby. And Dr. Link was like a worried father, wondering if his child had been born a hopeless idiot. But on the fourth day, he feared I was a wild animal. I began to make rasping

sounds with my vocal apparatus, in answer to the sharp little noises the dog Terry made. I shook my swivel head at the same time, and strained against my bonds.

For a while, as Dr. Link told me, he was frightened of me. I seemed like nothing so much as an enraged jungle creature, ready to go berserk. He had more than half a mind to destroy me on the spot.

But one thing changed his mind and saved me.

The little animal, Terry, barking angrily, rushed forward suddenly. It probably wanted to bite me. Dr. Link tried to call it back, but too late. Finding my smooth metal legs adamant, the dog leaped with foolish bravery in my lap, to come at my throat. One of my bands grasped it by the middle, held it up. My metal fingers squeezed too hard and the dog gave out a pained squeal.

Instantaneously, my hand opened to let the creature escape! Instantaneously. My brain had interpreted the sound for what it was. A long chain of memory-association had worked. Three days before, when I had first been brought to life, Dr. Link had stepped on Terry's foot accidentally. The dog had squealed its pain. I had seen Dr. Link, at risk of losing his balance, instantly jerk up his foot. Terry had stopped squealing.

Terry squealed when my hand tightened. He would stop when I untightened. Memory-association. The thing psychologists call reflexive reaction. A sign of a living brain.

Dr. Link tells me he let out a cry of pure triumph. He knew at a stroke I had memory. He knew I was not a wanton monster. He knew I had a thinking organ, and a first-class one. Why? Because I had reacted *instantaneously*. You will realize what that means later.

I LEARNED to walk in three hours.

Dr. Link was still taking somewhat of a chance, unbinding my chains. He had no assurance that I would not just blunder away like a witless machine. But he knew he had to teach me to walk before I could learn to talk. The same as he knew he must bring my brain alive fully connected to the appendages and pseudo-organs it was later to use.

If he had simply disconnected my legs and arms for those first three days, my awakening brain would never have been able to use them when connected later. Do you think, if you were suddenly endowed with a third arm, that you could ever use it? Why does it take a cured paralytic so long to regain the use of his natural limbs? Mental blind spots in the brain. Dr. Link had all those strange psychological twists figured out.

Walk first. Talk next. That is the tried-and-true rule used among humans since the dawn of their species. Human babies learn best and fastest that way. And I was a human baby in mind, if not body.

Dr. Link held his breath when I first essayed to rise. I did, slowly, swaying on my metal legs. Up in my head, I had a three-directional spirit-level electrically contacting my brain. It told me automatically what was horizontal, vertical and oblique. My first tentative step, however, wasn't a success. My knee-joints flexed in reverse order. I clattered to my knees, which fortunately were knobbed with thick protective plates so that the more delicate swiveling mechanisms behind weren't harmed.

Dr. Link says I looked up at him like a startled child might. Then I promptly began walking along on my knees, finding this easy. Children would do this more only that it hurts

them. I know no hurt.

After I had roved up and down the aisles of his workshop for an hour, nicking up his furniture terribly, walking on my knees seemed completely natural. Dr. Link was in a quandary how to get me up to my full height. He tried grasping my arm and pulling me up, but my 300 pounds of weight were too much for him.

My own rapidly increasing curiosity solved the problem. Like a child discovering the thrill of added height with stilts, my next attempt to rise to my full height pleased me. I tried staying up. I finally mastered the technique of alternate use of limbs and shift of weight forward.

In a couple of hours Dr. Link was leading me up and down the gravel walk around his laboratory. On my legs, it was quite easy for him to pull me along and thus guide me. Little Terry gamboled along at our heels, barking joyfully. The dog had accepted me as a friend.

I was by this time quite docile to Dr. Link's guidance. My impressionable mind had quietly accepted him as a necessary rein and check. I did, he told me later, make tentative movements in odd directions off the path, motivated by vague stimuli, but his firm arm pulling me back served instantly to keep me in line. He paraded up and down with me as one might with an irresponsible oaf.

I would have kept on walking tirelessly for hours, but Dr. Link's burden of years quickly fatigued him and he led me inside. When he had safely gotten me seated in my metal chair, he clicked the switch on my chest that broke the electric current giving me life. And for the fourth time I knew that dreamless non-being which corresponded to my creator's periods of sleep.

CHAPTER II

My Education

IN three days I learned to talk reasonably well.

I give Dr. Link as much credit as myself. In those three days he pointed out the names of all objects in the laboratory and around. This fund of two hundred or so nouns he supplemented with as many verbs of action as he could demonstrate. Once heard and learned, a word never again was forgotten or obscured to me. Instantaneous comprehension. Photographic memory. Those things I had.

It is difficult to explain. Machinery is precise, unvarying. I am a machine. Electrons perform their tasks instantaneously. Electrons motivate my metallic brain.

Thus, with the intelligence of a child of five at the end of those three days, Dr. Link taught me to read. My photo-electric eyes instantly grasped the connection between speech and letter, as my mentor pointed them out. Thought-association filled in the gaps of understanding. I perceived without delay that the word "lion," for instance, pronounced in its peculiar way, represented a live animal crudely pictured in the book. I have never seen a lion. But I would know one the instant I did.

From primers and first-readers I graduated in less than a week to adult books. Dr. Link laid out an extensive reading course for me, in his large library. It included fiction as well as factual matter. Into my receptive, retentive brain began to be poured a fund of information and knowledge never before equalled in that short period of time.

There are other things to consider besides my "birth" and "education." First of all the housekeeper. She came in once a week to clean up the house

for Dr. Link. He was a recluse, lived by himself, cooked for himself. Retired on an annuity from an invention years before.

The housekeeper had seen me in the process of construction in the past years, but only as an inanimate caricature of a human body. Dr. Link should have known better. When the first Saturday of my life came around, he forgot it was the day she came. He was absorbedly pointing out to me that "to run" meant to go faster than "to walk."

"Demonstrate," Dr. Link asked as I claimed understanding.

Obediently, I took a few slow steps before him. "Walking," I said. Then I retreated a ways and lumbered forward again, running for a few steps. The stone floor clattered under my metallic feet.

"Was—that—right?," I asked in my rather stentorian voice.

At that moment a terrified shriek sounded from the doorway. The housekeeper came up just in time to see me perform.

She screamed, making more noise than even I. "It's the Devil himself! Run, Dr. Link—run! Police—help—"

She fainted dead away. He revived her and talked soothingly to her, trying to explain what I was, but he had to get a new housekeeper. After this he contrived to remember when Saturday came and on that day kept me hidden in a storeroom reading books.

A trivial incident in itself, perhaps, but very significant, as you who will read this will agree.

TWO months after my awakening to life, Dr. Link one day spoke to me in a fashion other than as teacher to pupil; spoke to me as man to—man.

"You are the result of twenty years of effort," he said, "and my success amazes even me. You are little short of

being a human in mind. You are a monster, a creation, but you are basically human. You have no heredity. Your environment is molding you. You are the proof that mind is an electrical phenomenon, molded by environment. In human beings, their bodies—called heredity—are environment. But out of you I will make a mental wonder!"

His eyes seemed to burn with a strange fire, but this softened as he went on.

"I knew I had something unprecedented and vital twenty years ago when I perfected an iridium-sponge sensitive to the impact of a single electron. It was the sensitivity of thought! Mental currents in the human brain are of this micro-magnitude. I had the means now of duplicating mind-currents in an artificial medium. From that day to this I worked on the problem.

"It was not long ago that I completed your 'brain'—an intricate complex of iridium-sponge cells. Before I brought it to life, I had your body built by skilled artisans. I wanted you to begin life equipped to live and move in it as nearly in the human way as possible. How eagerly I awaited your debut into the world!"

His eyes shone.

"You surpassed my expectations. You are not merely a thinking robot. A metal man. You are—life! A new kind of life. You can be trained to think, to reason, to perform. In the future, your kind can be of inestimable aid to man and his civilization. You are the first of your kind."

THE days and weeks slipped by.

My mind matured and gathered knowledge steadily from Dr. Link's library. I was able, in time, to scan and absorb a page at a time of reading matter, as readily as human eyes scan lines. You know of the television principle—

a pencil of light moving hundreds of times a second over the object to be transmitted. My eyes, triggered with speedy electrons, could do the same. What I read was absorbed—memorized—instantly. From then on it was part of my knowledge.

Scientific subjects particularly claimed my attention. There was always something indefinable about human things, something I could not quite grasp, but science digested easily, in my science-compounded brain. It was not long before I knew all about myself and why I "ticked," much more fully than most humans know why they live, think and move.

Mechanical principles became starkly simple to me. I made suggestions for improvements in my own make-up that Dr. Link readily agreed upon correcting. We added little universals in my fingers, for example, that made them almost as supple as their human models.

Almost, I say. The human body is a marvelously perfected organic machine. No robot will ever equal it in sheer efficiency and adaptability. I realized my limitations.

Perhaps you will realize what I mean when I say that my eyes cannot see colors. Or rather, I see just one color, in the blue range. It would take an impossibly complex series of units, bigger than my whole body, to enable me to see all colors. Nature has packed all that in two globes the size of marbles, for *her* robots. She had a billion years to do it. Dr. Link only had twenty years.

But my brain, that was another matter. Equipped with only the two senses of one-color sight and limited sound, it was yet capable of garnishing a full experience. Smell and taste are gastronomic senses. I do not need them. Feeling is a device of Nature's to pro-

tect a fragile body. My body is not fragile.

Sight and sound are the only two cerebral senses. Einstein, color-blind, half-dead, and with deadened senses of taste, smell and feeling, would still have been Einstein—mentally.

Sleep is only a word to me. When Dr. Link knew he could trust me to take care of myself, he dispensed with the nightly habit of "turning me off." While he slept, I spent the hours reading.

He taught me how to remove the depleted storage battery in the pelvic part of my metal frame when necessary and replace it with a fresh one. This had to be done every 48 hours. Electricity is my life and strength. It is my food. Without it I am so much metal junk.

But I have explained enough of myself. I suspect that ten thousand more pages of description would make no difference in your attitude, you who are even now—

An amusing thing happened one day, not long ago. Yes, I can be amused too. I cannot laugh, but my brain can appreciate the ridiculous. Dr. Link's perennial gardener came to the place, unannounced. Searching for the doctor to ask how he wanted the hedges cut, the man came upon us in the back, walking side by side for Dr. Link's daily light exercise.

The gardener's mouth began speaking and then ludicrously gaped open and stayed that way as he caught a full glimpse of me. But he did not faint in fright as the housekeeper had. He stood there, paralyzed.

"What's the matter, Charley?" queried Dr. Link sharply. He was so used to me that for the moment he had no idea why the gardener should be astonished.

"That—that thing!" gasped the man, finally.

"Oh. Well, it's a robot," said Dr. Link. "Haven't you ever heard of them? An intelligent robot. Speak to him, he'll answer."

After some urging, the gardener sheepishly turned to me. "H-how do you do, Mr. Robot," he stammered.

"How do you do, Mr. Charley," I returned promptly, seeing the amusement in Dr. Link's face. "Nice weather, isn't it?"

For a moment the man looked ready to shriek and run. But he squared his shoulders and curled his lip. "Trick-ery!" he scoffed. "That thing can't be intelligent. You've got a phonograph inside of it. How about the hedges?"

"I'm afraid," murmured Dr. Link with a chuckle, "that the robot is more intelligent than you, Charley!" But he said it so the man didn't hear, and then directed how to trim the hedges. Charley didn't do a good job. He seemed to be nervous all day.

CHAPTER III

My Fate

ONE day Dr. Link stared at me proudly.

"You have now," he said, "the intellectual capacity of a man of many years. Soon I'll announce you to the world. You shall take your place in our world, as an independent entity—as a citizen!"

"Yes, Dr. Link," I returned. "Whatever you say. You are my creator—my master."

"Don't think of it that way," he admonished. "In the same sense, you are my son. But a father is not a son's master after his maturity. You have gained that status." He frowned thoughtfully. "You must have a name! Adam! Adam Link!"

He faced me and put a hand on my shiny chromium shoulder. "Adam Link,

what is your choice of future life?"

"I want to serve you, Dr. Link."

"But you will outlive me! And you may outlive several other masters!"

"I will serve any master who will have me," I said slowly. I had been thinking about this before. "I have been created by man. I will serve man."

Perhaps he was testing me. I don't know. But my answers obviously pleased him. "Now," he said, "I will have no fears in announcing you!"

The next day he was dead.

That was three days ago. I was in the storeroom, reading—it was housekeeper's day. I heard the noise. I ran up the steps, into the laboratory. Dr. Link lay with skull crushed. A loose angle-iron of a transformer hung on an insulated platform on the wall had slipped and crashed down on his head while he sat there before his workbench. I raised his head, slumped over the bench, to better see the wound. Death had been instantaneous.

These are the facts. I turned the angle-iron hack myself. The blood on my fingers resulted when I raised his head, not knowing for the moment that he was stark dead. In a sense, I was responsible for the accident, for in my early days of walking I had once blundered against the transformer shelf and nearly torn it loose. We should have repaired it.

But that I am his *murderer*, as you all believe, is not true.

The housekeeper had also heard the noise and came from the house to investigate. She took one look. She saw me bending over the doctor, his head torn and bloody—she fled, too frightened to make a sound.

It would be hard to describe my thoughts. The little dog Terry sniffed at the body, sensed the calamity, and went down on his belly, whimpering. He felt the loss of a master. So did I.

I am not sure what your emotion of sorrow is. Perhaps I cannot feel that deeply. But I do know that the sunlight seemed suddenly faded to me.

My thoughts are rapid. I stood there only a minute, but in that time I made up my mind to leave. This again has been misinterpreted. You considered that an admission of guilt, the criminal escaping from the scene of his crime. In my case it was a full-fledged desire to go out into the world, find a place in it.

Dr. Link, and my life with him, were a closed book. No use now to stay and watch ceremonials. He had launched my life. He was gone. My place now must be somewhere out in the world I had never seen. No thought entered my mind of what you humans would decide about me. I thought all men were like Dr. Link.

FIRST of all I took a fresh battery, replacing my half-depleted one. I would need another in 48 hours, but I was sure this would be taken care of by anyone to whom I made the request.

I left. Terry followed me. He has been with me all the time. I have heard a dog is man's best friend. Even a metal man's.

My conceptions of geography soon proved hazy at best. I had pictured earth as teeming with humans and cities, with not much space between. I had estimated that the city Dr. Link spoke of must be just over the hill from his secluded country home. Yet the woods I traversed seemed endless.

It was not till hours later that I met the little girl. She had been dangling her hare legs into a brook, sitting on a flat rock. I approached to ask where the city was. She turned when I was still thirty feet away. My internal mechanisms do not run silently. They make a steady noise that Dr. Link al-

ways described as a handful of coins jingling together.

The little girl's face contorted as soon as she saw me. I must be a fearsome sight indeed in your eyes. Screaming her fear, she blindly jumped up, lost her balance and fell into the stream.

I knew what drowning was. I knew I must save her. I knelt at the rock's edge and reached down for her. I managed to grasp one of her arms and pull her up. I could feel the bones of her thin little wrist crack. I had forgotten my strength.

I had to grasp her little leg with my other hand, to pull her up. The livid marks showed on her white flesh when I laid her on the grass. I can guess now what interpretation was put on all this. A terrible, raving monster, I had tried to drown her and break her little body in wanton savageness!

You others of her picnic party appeared then, in answer to her cries. You women screamed and fainted. You men snarled and threw rocks at me. But what strange bravery imbued the woman, probably the child's mother, who ran up under my very feet to snatch up her loved one? I admired her. The rest of you I despised for not listening to my attempts to explain. You drowned out my voice with your screams and shouts.

"Dr. Link's robot!—it's escaped and gone crazy!—he shouldn't have made that monster!—get the police!—nearly killed poor Frances!—"

With these garbled shouts to one another, you withdrew. You didn't notice that Terry was harking angrily—at you. Can you fool a dog? We went on.

Now my thoughts really became puzzled. Here at last was something I could not rationalize. This was so different from the world I had learned about in books. What subtle things lay behind

the printed words that I had read? What had happened to the sane and orderly world my mind had conjured for itself?

NIGHT came. I had to stop and stay still in the dark. I leaned against a tree motionlessly. For a while I heard little Terry snooping around in the brush for something to eat. I heard him gnawing something. Then later he curled up at my feet and slept. The hours passed slowly. My thoughts would not come to a conclusion about the recent occurrence. Monster! Why had they believed that?

Once, in the still distance, I heard a murmur as of a crowd of people. I saw some lights. They had significance the next day. At dawn I nudged Terry with my toe and we walked on. The same murmur arose, approached. Then I saw you, a crowd of you, men with clubs, scythes and guns. You spied me and a shout went up. You hung together as you advanced.

Then something struck my frontal plate with a sharp clang. One of you had shot.

"Stop! Wait!" I shouted, knowing I must talk to you, find out why I was being hunted like a wild beast. I had taken a step forward, hand upraised. But you would not listen. More shots rang out, denting my metal body. I turned and ran. A bullet in a vital spot would ruin me, as much as a human.

You came after me like a pack of hounds, but I outdistanced you, powered by steel muscles. Terry fell behind, lost. Then, as afternoon came, I realized I must get a newly charged battery. Already my limbs were moving sluggishly. In a few more hours, without a new source of current within me, I would fall on the spot and—die.

And I did not want to die!

I knew I must find a road to the city.

I finally came upon a winding dirt road and followed it in hope. When I saw a car parked at the side of the road ahead of me, I knew I was saved, for Dr. Link's car had had the same sort of hattery I used. There was no one around the car. Much as a starving man would take the first meal available, I raised the floorboards and in a short while had substituted hatteries.

New strength coursed through my body. I straightened up just as two people came arm-in-arm from among the trees, a young man and woman. They caught sight of me. Incredulous shock came into their faces. The girl shrank into the boy's arms.

"Do not be alarmed," I said. "I will not harm you. I—"

There was no use going on, I saw that. The boy fainted dead away in the girl's arms and she began dragging him away, wailing hysterically.

I left. My thoughts from then on can best be described as brooding. I did not want to go to the city now. I began to realize I was an outcast in human eyes, from first sight on.

Just as night fell and I stopped, I heard a most welcome sound. Terry's harking! He came up joyfully, wagging his stump of tail. I reached down to scratch his ears. All these hours he had faithfully searched for me. He had probably tracked me by a scent of oil. What can cause such blind devotion—and to a metal man!

Is it because, as Dr. Link once stated, that the body, human or otherwise, is only part of the environment of the mind? And that Terry recognized in me as much of mind as in humans, despite my alien body? If that is so, it is you who are passing judgment on me as a monster who are in the wrong. And I am convinced it is so!

I hear you now—shouting outside—*beware that you do not drive me to be*

the monster you call me!

THE next dawn precipitated you upon me again. Bullets flew. I ran. All that day it was the same. Your party, swelled by added recruits, split into groups, trying to ring me in. You tracked me by my heavy footprints. My speed saved me each time. Yet some of those bullets have done damage. One struck the joint of my right knee, so that my leg twisted as I ran. One smashed into the right side of my head and shattered the tympanum there, making me deaf on that side.

But the bullet that hurt me most was the one that killed Terry!

The shooter of that bullet was twenty yards away. I could have run to him, broken his every bone with my hard, powerful hands. Have you stopped to wonder why I didn't take revenge? *Perhaps I should! . . .*

I was hopelessly lost all that day. I went in circles through the endless woods and as often blundered into you as you into me. I was trying to get away from the vicinity, from your vengeance. Toward dusk I saw something familiar—Dr. Link's laboratory!

Hiding in a clump of bushes and waiting till it was utterly dark, I approached and broke the lock on the door. It was deserted. Dr. Link's body was gone, of course.

My birthplace! My six months' of life here whirled through my mind with kaleidoscopic rapidity. I wonder if my emotion was akin to what yours would be, returning to a well-remembered place? Perhaps my emotion is far deeper than yours can be! Life may be all in the mind. Something gripped me there, throbbingly. The shadows made by a dim gas-jet I lit seemed to dance around me like little Terry had danced. Then I found the book, "Frankenstein," lying on the desk whose drawers

had been emptied. Dr. Link's private desk. He had kept the book from me. Why? I read it now, in a half hour, by my page-at-a-time scanning. And then I understood!"

But it is the most stupid premise ever made: that a created man must turn against his creator, against humanity, lacking a soul. The book is all wrong.

Or is it? . . .

As I finish writing this, here among blasted memories, with the spirit of Terry in the shadows, I wonder if I shouldn't. . . .

It is close to dawn now. I know there is not hope for me. You have me sur-

rounded, cut off. I can see the flares of your torches between the trees. In the light you will find me, rout me out. Your hatred lust is aroused. It will be sated only by my—death.

I have not been so badly damaged that I cannot still summon strength and power enough to ram through your lines and escape this fate. But it would only be at the cost of several of your lives. And that is the reason I have my hand on the switch that can blink out my life with one twist.

Irony, isn't it, that I have the very feelings you are so sure I lack?
(signed) Adam Link.

* MAGNIFYING THE MINUTE *

The use of a lens for magnifying purposes is ancient, but the first compound microscope was probably made by a Dutchman named Zacharias Jansen in 1590. This invention was followed up by the astronomer, Galileo, a few years later. But it did not become an effective instrument until about the middle of the eighteenth century.

In a simple microscope we look at the object directly through a lens or through several lenses. This kind of instrument is often used for microscopic dissection.

But in the compound microscope we look through an eye-lens or ocular at an inverted image of the object formed inside the tube of the microscope by an objective, or an object-lens. In all simple microscopes there are two lenses in the eyepiece and three lenses in the objective. All sorts of ingenious devices have been invented for making the most of magnification without sacrificing clarity or definition of detail.

In the pioneer days of microscopy, the instrument was mostly considered a scientific toy. Its uses were to magnify objects for purposes of reproduction in either drawings or paintings, but the opportunity offered to learn more about the wonders of the small was not grasped. Understanding what we see in microscopy means much more than great magnification. Such magnification is useless without intelligible interpretation.



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A MESSAGE TO THE FUTURE

Five thousand years into the future! Will this amazing scientific attempt to preserve a record of our present civilization for posterity survive the ravages of time?

AMAZING STORIES is proud to inform its readers that a copy of the October, 1938 issue, reduced to microfilm, has been selected by a committee of scientists, for inclusion in the Westinghouse Time Capsule, prepared as a message to the people of 5,000 years from now in an effort to preserve for them a tangible and comprehensive record and cross-section of our present-day civilization.

It is interesting to note that only five of the so-called "pulp" magazines and twenty of the "slicks" were included by this committee. Therefore AMAZING STORIES feels quite honored to know that it is one of the representative five, best suited to convey a cross-section of what we of today like to read.

A complete description of this unique message to the future follows:

* * *

Exactly at high noon (standard time) on September 23, 1938, the moment of the Autumnal Equinox, the Westinghouse Time Capsule, carrying a compressed storehouse of information about today's civilization, began its 5,000-year journey into the future at the New York World's Fair Grounds.

With the declaration: "May this Time Capsule sleep well. When it is awakened 5,000 years from now may its contents be found a suitable gift to our far-off descendants." A. W. Robertson, Chairman of the Westinghouse Electric & Manufacturing Company, gave the signal to lower the burnished Cupaloy Capsule fifty feet into the ground at the site of the Westinghouse building, a model of which was afterward unveiled.

To the solemn booming of a giant bell, the Capsule disappeared slowly into the earth. Workmen screwed down and sealed the cap, symbolically dispatching, for delivery in 5,000 years, the heaviest "letter" ever "mailed."

During the World's Fair the Capsule may be on view through a periscope, and inside the Westinghouse Building will be a replica, together with duplicates of all the objects, books, fabrics, alloys, toys, newspapers and other items it contains.

When the Fair is over pitch and concrete will be poured down the Well; the retaining pipe will be removed, and the Capsule will be left for discovery by archaeologists of the future.

Libraries, museums and other carefully chosen repositories all over the world, have received copies of the Book of Record of The Time Capsule, containing information that will guide future historians back to the spot when the proper time

Top, with device for hoisting

Mark where future Archaeologists will saw to open

Outer shell of Cupaloy, a copper alloy harder than steel

Pyrex glass inner envelope

Objects to be preserved

Mastic waterproofing and shock proofing

7 FEET 6 INCHES

Diagram of Westinghouse 5000 year Time Capsule

AMAZING STORIES

has arrived. The Capsule's contents, selected with the aid of some of the country's foremost archaeologists, historians, scientists, editors and librarians, are such as to provide a complete story of modern times, including a Key to English which will enable people of the future to translate and pronounce today's language, and read what has been left for them in the Time Capsule.

In an address by A. W. Robertson on the Occasion of the Depositing of the Capsule, he said:

"We have gathered here to deposit a record of our time for the information of posterity 5,000 years hence. Five thousand years was se-

activity, and realized then, as we do now, that they were mortal, and struggled to create something that would be immortal. They built temples of stone, made mausoleums, tombs and pyramids that were intended to last forever, but few of them survived. Only tiny fragments of the civilizations of which they were a part are known.

"Our civilization may go the same way in five thousand years unless such projects as that represented by the Time Capsule are successful. The modest sum spent on the Capsule and its contents, placed at compound interest for 5,000 years, would amount to a fabulous sum, but the

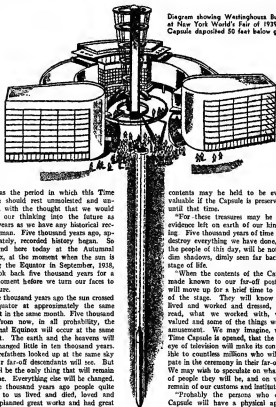


Diagram showing Westinghouse Building at New York World's Fair of 1939, with Capsule deposited 50 feet below ground

lected as the period in which this Time Capsule should rest unmolested and unopened, with the thought that we would project our thinking into the future as many years as we have any historical record of man. Five thousand years ago, approximately, recorded history began. So we stand here today at the Autumnal Equinox, at the moment when the sun is crossing the Equator in September, 1938, and look back five thousand years for a brief moment before we turn our faces to the future.

"Five thousand years ago the sun crossed the Equator at approximately the same moment in the same month. Five thousand years from now, in all probability, the Autumnal Equinox will occur at the same moment. The earth and the heavens will have changed little in ten thousand years. Our forefathers looked up at the same sky that our far-off descendants will see. But this will be the only thing that will remain the same. Everything else will be changed.

"Five thousand years ago people quite similar to us lived and died, loved and hated, planned great works and had great

contents may be held to be even more valuable if the Capsule is preserved intact until that time.

"For these treasures may be the only evidence left on earth of our kind of living. Five thousand years of time may well destroy everything we have done, and we, the people of this day, will be nothing but dim shadows, dimly seen far back on the stage of life.

"When the contents of the Capsule are made known to our far-off posterity we will move up for a brief time to the front of the stage. They will know how we lived and worked and dressed, what we read, what we worked with, what we valued and some of the things we did for amusement. We may imagine, when the Time Capsule is opened, that the all-seeing eye of television will make its contents visible to countless millions who will participate in the ceremony in their far-off homes. We may wish to speculate on what manner of people they will be, and on what will remain of our customs and institutions.

"Probably the persons who open the Capsule will have a physical appearance

very like our own, except that they should have learned the principle of breeding a better race. These men and women should be as healthy as the healthiest, sturdy as the sturdiest, as beautiful as our most beautiful, and as intelligent as the best of us today. They should be, and probably will be, a race of supermen and superwomen, as judged by our standards; but only common men and women as judged by their standards. The need of perpetuating a better race may perhaps be bred in the younger people of that day, even as our forefathers taught us religion.

"For centuries, if some contemporary estimates are correct, the northern hemisphere will become warmer and the summers more tropical, so that civilization will have pushed far north. Undesirable sections will not be occupied, but will be allowed to become natural game reservations and great national parks.

"Public sports and pageants of tremendous scope and significance will very likely be popular. Every community will have its theater and all will take part from time to time. Local orchestras and great choruses will be common. This will be a healthy world governed by wholesome people. The abnormal will have no place in it. Good health will be the rule, and the vigor of the people will make an active life the only happy life.

"What we do here today is precedent. The present civilization has an obligation to itself to make its contribution to the future as eternal as possible. No longer should we trust to mere accident to perpetuate the record but with forethought and sound judgment bury in the earth imperishable records of our time."

The casting and precision machining of the seven-foot "Time Capsule" was done by expert craftsmen at the company's East Pittsburgh Works. The 800-pound Cupaloy metal envelope is intended to preserve for scientists of 6439 A.D. a tangible record of life in our time and a secret of hardened copper.

While this metallic message to the ages will preserve a cross-section of our modern achievements in science and art, as represented by news reels and books reproduced in microfilm and selected products from laboratories, factories and cities, it will also contain the formula for Cupaloy, the copper alloy of which the capsule is made.

Literally the capsule symbolizes the key to the "Philosopher's Stone" for which the ancient alchemists had searched in vain since the days of the Pharaohs, striving to transmute one metal into another. Utilizing modern science's discovery of the secret of space lattices of the crystals of invisible atoms that make up the 92 known elements of the earth, Westinghouse metallurgists carried to success a five-year research to make copper as hard as steel. The result was Cupaloy, a heat-treatable alloy composed of copper, chromium and silver.

The investigators discovered that a small amount of silver added to copper and chromium

helped to strengthen the basic metal. They forced the chromium atoms to group themselves to form billions of crystallites distributed quite uniformly through the mass of mixed metals. The peculiar arrangement of the chromium atoms made the metallic mass hard. The relatively few silver atoms acted as stabilizers of the alloy after it had been temper-hardened, increasing its resistance to the softening effects of long exposure to high temperatures.

Already this alloy is at work in industry as welding electrodes, welding tips and in other tasks where high electrical conductivity and heat resistance are essential qualities. Research engineers selected it for the 5,000 years' Marathon against time as the most practicable means of delivering intact a visual record of the present day.

But will this metal resist the corrosion effect of sea water seeping through the foundation soil of New York City during the next five millennia? Engineers think that it will.

Copper is quite resistant to the attack of sea water seepage from the ocean. It is particularly so when the situation is such that the products of initial corrosion can accumulate and protect the underlying metal. Cupaloy may be expected to behave equally well in view of laboratory corrosion tests made some time ago. In fact it appears possible that the presence of the chromium in the alloy will act to increase the protective value of the "patina" of film which would be expected to form under the influence of undisturbed soil corrosion. Confidence in Cupaloy's ability to withstand the attacks of time is strengthened by the fact that many copper alloy implements have come down to us from antiquity.

In electrolytic reactions with corrosion salts such as iron salts in the soil, copper becomes the anode or positive electrode, and therefore receives deposits instead of being eaten away.

The Time Capsule was cast in seven sections and after machining, all segments except the last were screwed together and sealed with an asphalt compound. The joints were then peened out and burnished, forming a solid unbroken outside shell of Cupaloy, shaped like a torpedo seven feet six inches long and eight inches in diameter.

If the metallurgists of 6439 want to make a Time Capsule to guard their own legacy to the year 11939 A.D., this, roughly, is the recipe they will follow:

Melt the copper then deoxidize it with boron. Add hardening briquettes of copper-chromium, mix in a "pinch" of silver and stir well while the metal heats in a crucible furnace at 2500 degrees Fahrenheit. Then cast in a mold and machine.

The Time Capsule contains a six-foot inner crypt of heat-resistant glass from which the air has been evacuated and replaced by an inert gas to act as a preservative.

The sealed glass tube is wrapped with glass tape and embedded in a waterproof compound. The Cupaloy sections are shrunk-fit on tapering threads, producing a water-tight joint.

INTERPLANETARY

CHAPTER I

The Strange Planet

THERE she was: just like a picture postcard. The Earth looming hazily through her thin blanket of atmosphere, the moon, floating gracefully to one side and the brilliant sun cradled in its nimbus of reds, greens and yellows that made up the corona.

Passengers aboard the giant Tunard space liner voiced the *ohs* and *ahs* that had become so familiar to Brice Lucas during his five years as first pilot on the *Amphitryon*.

Lucas could sympathize with the passengers. He had felt the same way years ago when he first saw the sight from one million miles out on the Earth-Mars orbit. He had felt the powerful fascination of the view, dwarfing him into insignificance; he had sensed the ageless wonder of its existence long before there had been man to observe it. But Lucas had learned early in his career that this sight marked the beginning of danger.

The universe and its ways are ruthless, cruel without mercy, possessing the depravity of a senseless machine bent on destruction. Space flight is not new, for five hundred years have elapsed since the first flight from the earth to the moon in 2039, but each milestone of progress since that time has been marked by tragedy, heroism and sacrifice.

Man still has failed in his attempts to solve all laws governing the forces of interstellar space. Interplanetary flight constantly is confronted with new conditions, new circumstances that de-



manded every ounce of skill and often human lives to overcome. Accidents are fewer now, but they are not unheard of. Mysterious, baffling forces still lurked unseen on the spaceways and no craft traveling in the interplanetary void is certain of reaching its destination.

"It—it's like a cobra, ready to strike: beautiful, fascinating, yet deadly!" came a half-whispered feminine voice at Lucas' elbow.

Brice Lucas wheeled.

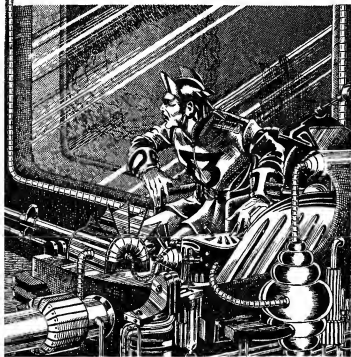
"You're not—" he began, intending

GRAVEYARD

By R. R. WINTERBOTHAM

Before them loomed the Earth and safety, then, with the speed of light they found themselves trapped in the gravity field of an incredible world known as Procrustes.

Illustrated by Julien S. Krupa



The girl trained her pistol straight at the pilot's heart

to tell the young woman that no passengers were allowed in the control cabin during flight. But he did not finish. His eyes caught a glimpse of beauty: dark blue eyes, brown, fluffy hair, a delicate, turned up nose and sweetly pouted lips.

Women were infrequent travelers on interplanetary ships and those that did travel were rarely beautiful. But this girl proved that no generalization is quite accurate. She was, Lucas decided, the most beautiful woman he had seen in the many worlds he had visited.

Now Lucas recalled who she was. She was the daughter of the white headed old man who had boarded the ship in company with Oaxa Azil, the wealthy young Martian colonist.

"Please don't tell me to leave," she pleaded. "The view is so much better here. Of course, I know it's against the rules, but I'm not an ordinary passenger. My father, Wendel Layden, used to be a stockholder in the Tunard line."

Of course—the girl was Wyltha Layden, fiancée of Oaxa Azil, enroute to Mars where the wedding was scheduled to take place next month. It had been rumored that the girl was marrying Azil for his money—this girl, so pretty, so clear eyed and innocent looking.

"Yes," smiled Lucas cynically, "and your fiancé owns most of the stock in the line right now. I'm sorry, Miss Layden, but even in your case the rules can't be broken. Your safety and that of all the passengers is in my hands and every rule must be obeyed."

"But I won't bother you in the least!" insisted the girl, pouting.

Lucas decided that she was a spoiled brat. She couldn't be the sweet young thing she appeared to be—no woman who married for wealth could. Perhaps, after all, the rumors were wrong and the marriage was a love-match.

Lucas almost laughed at the thought! Oaxa Azil betrayed his Martian blood in more ways than one. He looked more like a beast than a man, with scaly skin, greenish facial pigmentation, faceted eyes and vicious canine teeth. No beauty would wed that beast for reasons of love!

"Miss Layden!" began Lucas angrily. "Get out!"

"There's no reason for you to talk to my fiancée like that!" came a hoarse voice from the doorway.

Oaxa Azil, his eyes sparking the hate that was so common among young Martians for their more-handsome, contemporary earthmen, entered the room.

"The order applies to you, too, sir!" snapped Lucas, unbecomingly. Lucas tried to fight it off, but he felt a resentment that Azil should claim this young woman as fiancée, even with her consent.

"Perhaps, my dear man, you're not aware of my position—" began Azil.

"I know who you are and I know you practically own the line," roared Lucas. "But I've legal authority to order you out of here while we're in interplanetary space. The lives of everyone on board are in my hands. Get—"

One of the instruments on the panel in front of Lucas emitted a shrill, buzzing noise. Instantly Lucas sprang to the controls, forgetting the passengers who had entered the room. His body tensed as he eyed gauges, dials and indicators massed in a bewildering embankment on the panel.

Lucas' arm shot out and grabbed a phone from its hook.

"Engine room!" he shouted. "Engine room! What's the matter! There's no need for acceleration now!"

Wyltha Layden glanced through the back port of the control cabin, huilt up from the top of the craft, like a conning tower of a submarine. A dim

speck in the distance was the sun, which a few minutes before had loomed as big and as bright as terrestrial eyes had seen it from Earth. The sun's size now would indicate that in a space of less than two minutes the craft had traveled beyond Mars' orbit.

Such a speed would indicate that the *Amphitryon* had exceeded the velocity of light!

The girl's eyes swept toward the front port. There, dead ahead, appeared the shining disc of a planet. But it was no planet familiar to the girl. It lacked the redness of Jupiter, the rings of Saturn and the canals of Mars. Whatever planet it was, it was close and at the terrific speed the craft must have traveled in the past few minutes, the *Amphitryon* would crash in a few seconds!

"Cut blasts!" screamed Oaxa Azil, his face turning from green to livid blue.

Lucas replaced the telephone on its hook.

"They've been cut!" snapped the pilot. "If you two had kept out of this cabin, as you've had orders to do, I might have avoided this trouble!"

"Trouble?" Azil's voice trembled with fear.

"Come Oaxa," said the girl. "I guess we were wrong. Let's get out of here now, before anything else happens."

Lucas noted with a slight sense of satisfaction that there was no tenderness in the way Wyltha looked at her fiancé. Only contempt.

"No you don't!" announced the pilot, springing to the doorway and snapping the lock. "You two will stay here—until Mr. Azil cools off at least. I won't let you go below in a mortal funk, perhaps throwing the other passengers into a panic!"

Lucas picked up his phone again and dialed a connection with the loud

speaker system of the space liner.

"All passengers to their quarters while course corrections are being made!" the pilot announced. "A slight miscalculation has made adjustments necessary."

As he finished a gentle rap sounded at the doorway.

"Who is it?" asked Lucas.

"It's me—Jim," came the ungrammatical reply. "I've Wendel Layden with me. He says there's something screwy about that planet that's dead ahead and he wants to explain."

CHAPTER II

The Dead Spot in Space

WENDEL LAYDEN was a white-haired, mild mannered old man, who had made a fortune in the passenger service between Mars and Earth, only to lose everything he made in a wildcat mining venture on Martian soil. He was known to the younger generation of pilots and spacemen only by legend, but it was said that no man had traveled more widely in the solar system, nor had faced death more times.

Layden watched Lucas bring the craft around, facing outward away from the mysterious planet. The maneuver was completed through the use of small steering rockets, with the large, atomic power rockets silent. At the conclusion of the turning, Lucas stepped toward the telephone to order the resumption of power, but Layden put his hand on the pilot's shoulder.

"Don't try it yet," he said.

"Why not?" asked the pilot.

"If this planet is Procrustes, it won't do any good," replied Layden, glancing at his daughter. The girl had moved away from her Martian companion and was standing near Lucas, wide eyed in some sudden realization.

"There's no planet by that name,

Layden," replied Lucas. "And if there were, our rocket motors could get out of her sphere of attraction."

Layden shrugged.

"Go ahead, then," he replied.

Once more the rockets sent trembling vibrations through the ship. Instruments showed an exhaust velocity that should have sent the craft scudding outward into the spaceways. But Procrustes, behind them now, grew no smaller and the dim, pin-point of the sun far ahead grew no brighter.

"Something's the matter with the mixture—we're getting no acceleration!" exclaimed Lucas. "I suppose we'd better land on this thing—asteroid or whatever it is—and make some repairs."

Layden shook his head as the craft once more was wheeled about. Again the rocket motors sent volcanic blasts into the ether—this time with the ship's nose pointed toward Procrustes. But the planet grew no nearer.

"We're stuck!" exclaimed Jim Vorhees, the second pilot. "Something's holding us here!"

Lucas glanced at Layden, who nodded.

"I nearly got stuck here once before," said Layden. "I've named this planet Procrustes, the dead spot in the universe, where no laws seem to be in force!"

"How did you get away?" asked Lucas.

"I didn't get as close as you are, or I'd never have gotten away," said Layden. "But I got close enough so that I used all my fuel and drifted for nearly a month until a patrol ship found me and towed me into port."

"What is it? What's happened?" demanded Azil, nervously.

"Something we'll never escape," grinned Layden, "for which I thank God—not that I don't feel sorry for

these people that are stuck with us, but I'd rather see my daughter dead than married to you!"

"Father!"

An icy stillness closed in over the cabin as the girl screamed.

"Father!" she choked. "I was doing it for you! You'd lost everything and you couldn't spend your old age penniless!"

"I couldn't dissuade you, daughter," said Layden. "But you don't have to marry him now."

"You—you mean we'll die?" gasped Oaxa Azil. The loss of his sweetheart was not affecting him nearly as much as the idea of doom.

"Probably by slow starvation," nodded Layden. "At least it will be slow. You see, we're stuck in spacial mud—so to speak—and it'll hold us tighter than any terrestrial mud you've ever seen, because of a peculiar magnetic phenomenon that is inherent to Procrustes."

All eyes gazed out of the porthole toward the planet. It had an atmosphere, probably continents, oceans, rivers, and maybe inhabitants.

"But you can't land on it," said Layden, reading the thoughts of that little group in the control cabin. "We're as close and as far away as we'll ever get."

"But our rockets—" began Jim Vorhees.

"Are about as useful as a tin whistle," said Layden.

"There's a funny thing about this world. Magnetic conditions in the vicinity of the planet operate along the same lines as the Fitzgerald contraction, only, of course, it's quite different."

"The nearer we get to the planet, the closer the atoms in our bodies are packed. As a result we get smaller, but we don't realize it. We only know that the relative distance to the planet remains the same. No matter how close

we go to the planet, we'd still be just as far away, because the nearer we get, the smaller we become. Our ship, our rocket fuel, our instruments, everything decreases in the same proportion."

"Then why can't we turn around and sail away?" asked Lucas.

"Because there is, in some way I can't quite explain, a similar decrease in mass. The decrease in mass doesn't enter into our problem when we're going toward the planet, because the contraction takes care of everything. But going away, we will find that our rockets, fuel and driving power is far too small to send the front end of the craft through space. The front end of the ship is expanded far beyond what the rocket motors, decreased and shrunken in the rear of the ship, can push."

"Could we spiral out?" asked Jim.

"No, because the rocket power nearest the planet would be decreased and the rocket power furthest from the planet would be increased—the ship would be driven in, toward the planet despite our attempts to move away."

"I don't believe it!" snarled Azil. "Such a thing is impossible!"

"Well," drawled Layden, "you saw these pilots try to get us out of here just a few minutes ago, and you saw what luck they had. In my case, I didn't come close enough to get completely mired by this planet, but I got too close for comfort. That's why I named it Procrustes—after the Greek that stretched and shrunk his guests to fit a bed he prepared for them."

"Why isn't this planet visible to telescopes on earth?" asked Lucas.

"It really isn't much larger than a meteorite," declared Layden. "But the shrinking effect renders its size larger as we get closer to it. You see we shrank quite a bit in the minute or two after we entered its sphere of influence. During that time the distance from the sun and

the earth seemed to increase—in reality they're not further away than before, but we're smaller and the miles are many times more miles—to us."

"Get us out of here!" begged Azil. "If you do, Lucas, I will make you a rich man—a very rich man."

It was a dismal little group that sat in the control cabin on the eve of the following day according to the chronometers in the cabin, which everyone knew had been affected by the shrinking process the same as everything else. No one really knew whether it was a day or five minutes since the ship had mired in the Procrustes' grip.

Lucas and Vorbees were at the controls, keeping the ship pointed outward, away from Procrustes.

Nearby sat Wyltha Layden, beside her father. In a corner, alone in a cowardly funk, sat the Martian, Oaxa Azil.

During the past few hours the girl had proven herself to be of stern stuff. She had buoyed up spirits of passengers, locked in their cabins to prevent panic, and she had assisted in every way possible in attacking the problem that presented itself.

"I've got an idea," said Lucas slowly, "of how to get out of this fix!"

Everyone was on his feet in an instant, pressing Lucas for details. He held up his hand for silence.

"How far are we—in regular, full sized miles—from the earth?" Lucas asked Layden.

"Probably not much more than a million miles," said Layden. "That's the distance we were from Earth just before the sudden shrinking."

"A lifeboat could make it in a day, then?" asked Lucas.

"A lifeboat could if it could get away from Procrustes," replied Layden. "But it would have the same trouble getting away that the *Amphitryon* has

had."

"There's a 40-passenger lifeboat stored underneath the ship," Lucas announced. "That will take care of everyone aboard. Jim you see that everyone gets aboard, but first take every crumb of food and every ounce of water, except enough to last one day, out of the boat. Then when every one goes aboard, see that they take only necessities. All extra clothing, all baggage and personal belongings must be left behind."

"What are you going to do?"

"I'm going to switch the *Amphitryon* around facing Procrustes," said Lucas. "The lifeboat is going to get under her jets and I'm going to give the craft full acceleration dead ahead. The force of the jets will toss the lifeboat away, out of the influence of Procrustes, like a chip of wood in the stream of a firehose."

"Yes, but who's going to stay behind and operate the rockets on the *Amphitryon*?" asked Jim.

"I am!" announced the pilot.

A dead silence crept over the group.

"You mean you'll stay behind on this ship—to die?"

"I'm the captain!" declared Brice Lucas, and his eyes carried a look that meant it.

The transfer was made to the lifeboat in an orderly manner. The passengers were reasonable and there was no panic, inasmuch as Lucas' plan was presented as the only possible way for an escape from the haffling forces that held the *Amphitryon* in a vise-like grip.

Finally the spacelocks of the liner were closed and Lucas walked into the control room.

"Brice! Brice Lucas!" The loudspeaker in the control room carried Jim Vorhees' voice.

"Okay, Jim!" replied Lucas into his radio microphone tuned to the lifeboat.

"Are you ready?"

"Mr. Layden says his daughter isn't aboard. Is she with you?"

"Wyltha? Why no—"

Lucas eyes were drawn toward the door. There stood the girl training a pistol straight at the pilot's heart.

Before Lucas could utter a word, the girl reached toward the radio control panel and cut the microphone switch.

"Listen to me, Brice Lucas!" began the girl. "You're not going to get away with this, do you hear?"

"Get away with this?" replied the pilot. "Are you mad?"

"If you want those people in the lifeboat to get home safely, tell Vorhees that my father probably didn't see me and that I'm on the lifeboat!"

"But—"

"There isn't a minute to lose!" snapped the girl. "You want to be a hero and a martyr, do you, Brice Lucas? Well, you're not going to be one. And there isn't time to talk about it. Give the signals and open your rockets!"

"If I don't?"

"Then I'll shoot you dead, because you'll die anyhow much more slowly and with much more pain! And if I shoot you everyone in that lifeboat will die!"

"You win," said Lucas.

The girl opened the microphone switch again.

"I—I've looked everyplace, Jim," said the pilot. "Miss Layden isn't aboard the *Amphitryon*. Probably her father doesn't know where to find her. Okay. Let's go!"

With these words, Brice Lucas released the rockets. The craft trembled with the force of a mighty blast.

"All right!" smiled the girl. "Cut them!"

"But—"

"Cut them, I said!" The revolver

moved menacingly.

Brice Lucas cut the rockets.

Suddenly the planet ahead of them grew smaller. It faded to a small disc and then disappeared.

"Look!" screamed the girl, pointing out the rear port of the control cabin.

A short distance ahead drifted the lifeboat, her rockets purring toward Earth. To the right gleamed Mars and to the left were the earth and the moon, shining once more in full glory.

"We're free!" gasped Wyltha incredulously.

Lucas grinned suddenly. "I get it!" he exclaimed. "It was gravity! Gravity pulled us away from Procrustes—the gravity of the lifeboat, made large once more!" *

He ceased speaking, and stared at the girl, his face suddenly sober. "Why did you stay aboard?" he asked suddenly.

The girl's eyes dropped. "For Dad

* Lucas is correct in his explanation. Even the small lifeboat had a gravity constant. Everything in the universe, a giant sun or a single atom, exerts a gravitational pull on every other speck of cosmic dust.

In the vicinity of Procrustes, the *Amphitryon* had lost mass and was held by the gravitational pull of an ordinary-sized meteorite. Then the lifeboat, tossed away from the *Amphitryon* suddenly regained its size and, with this, its mass. The lifeboat's mass for an instant outweighed the parent ship and outpulled the forces of Procrustes. The *Amphitryon* was dragged away from the sinister forces that held it.—Ed.

—and myself," she whispered. "I just couldn't go to Oaxa Azil again, and if we were all saved, I would do it, for Dad, even though he wouldn't wish me to. But I still have my insurance, and it amounts to quite a bit. If I were dead, Dad would have enough to keep him the rest of his life. And I'd much rather provide for him that way than—than the other."

"You're a brick!" breathed Lucas in admiration.

But she remained sober, and he saw a despairing look in her eyes.

"What's the matter?" he queried.

She shrugged. "Nothing—except that now I'm right back where I started. . . ."

Lucas grinned as he turned to the controls. "No you aren't," he said softly. "You see, before I put Oaxa Azil in the life boat, I made him give your father a nice sizable check—for saving his life. I figured it was the best thing I could do for the injustice I did you."

"Injustice?" Her eyes were wide with amazement.

"Yeah, for thinking you were the sort of a woman who'd marry for money, and especially an ape like Oaxa Azil."

For an instant she stared at him, then she murmured: "You're something of a brick too, aren't you, Brice Lucas!"



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Battle



in the Dawn

By

MANLY WADE WELLMAN

SSTONE-AGE Europe was spacious, rich and uncrowded; but there could be only one race of rulers.

Homo Neanderthalensis must have grown up there from the beginning, was supreme and plentiful as the last glaciers receded. His bones have been found from Germany to Gibraltar, and his camps and flints and fire-ashes. We reconstruct his living image—burly and stooped, with a great protruding muzzle, beetling brows, no chin and no brow. Perhaps he was excessively hairy—hardly a man, but

into the country of the terrible Gnorris came the tribe of Hok, to wage a grim battle for supremacy.

more than a brute. Fire was his, and the science of flint-chipping. He buried his dead brothers, apparently believing in a hereafter, even a deity. He could think, perhaps speak. He could fight, too.

When real men first came through the eastern mountain passes or out of the great valley now drowned by the Mediterranean, battle ensued. The invaders

A flood of Gnorris came scrambling up the channel; desperately the humans battled to repulse them



were *Homo Sapiens*, in body and spirit like us, their children. They could not parley with the abhorrent foe they found; there could be no rules of warfare, no truces or treaties, no mercy to the vanquished. Such conflict could die only when the last adversary died.

It must have been a struggle generations long. Was it not full of daring, despair, sacrifice, triumph? Was not the conquest the greatest, because the most fundamental, in the history of the race? No champions of mankind ever bore a greater responsibility than those first little bands who crossed, all unaware, the borders of Neanderthal country.

With one such band, at the moment of such crossing, our story begins:

CHAPTER I

The Land of the Gnorrh

THE southern country had come to hold too few game herds, too many hostile bands of fellow-hunters; hence the family's spring migration, many days' journey into the north which these days grew warmer than their fathers had known it.

This particular bright morning found the whole nine scattered. A foolish deer, grazing too close, bounded away with a javelin in its shoulder, and the swiftest runners led the chase with the rest trailing behind. So from horizon to horizon and beyond, with flecks of blood to point the way across rich green meadows, and hunger to quicken moccasined feet. The sun had reached zenith and passed when the first of the hunters, gaining the top of a little knoll, saw that the prey had fallen and died just beyond.

That first-comer was the eldest son of the wandering household, and the tallest and swiftest. He was as strong as the leopard whose pelt he wore for

single garment, and his smooth young skin showed tanned and healthy with good outdoor living. His lion-tawny hair had been cut shoulder length and was bound back from his shrewd face with a snakeskin fillet. His chin, plucked clean of beard as custom decreed with bachelors, jutted squarely. His mouth was wide and good-humored beneath a straight nose, and his gray eyes opened widely, clearly. In one hand he swung a stone-bladed axe, and a loop at his shoulder held the mate to the javelin that had pierced the deer. His name, and he hoped to make it great, was Hok.

Pausing thus, Hok grinned triumphantly for just the half of an instant. Then his eyes narrowed and his lips drew tight. Something dark and shaggy crouched on the far side of the fallen animal. A bear? Hok's free hand flashed backward, twitching the second javelin from its strap.

Behind came the patter of other feet, and a comradely panting. That was Zhik, a younger half-brother and favorite companion. Not as tall as Hok, nor as old by three years, the stripling nevertheless was sturdy and handsome. Hurrying from behind, he poised a spear of his own.

At that moment the shaggy thing rose from the side of the deer, rose on two legs to face them. It was not a bear.

Barely thirty paces separated the youths from the creature that disputed their right to the meat.

It had hands and feet, coarser and larger than Hok's own; it was a head shorter than he, but broader; it wore no clothes, and coarse hair thatched shoulders, chest and knotted limbs. Then its eyes grappled Hok's across the intervening space.

Shrewd were those eyes, in a broad, shallow skull like the skull of a hairy lizard. Fire was in them, and intelli-

gence and challenge. The two bright crumbs of vision, under their coarse brows, did not falter before Hok's gaze as would a beast's. Meeting the stare, startled and fierce on his own part, the hunter-youth was aware only vaguely of the rest of the face—out-flaring nostrils, a sagging lip, a hideous rank beard and forelock, ears that seemed to prick like those of a wolf.

Zhik drew in his breath, as if setting himself for the cast. "Wait," interposed Hok quickly, he did not know why.

A third human figure had come from behind—the Chief, their father and head of the party, a hunter still vigorous and swift but unable to match forever the pace of these two eldest sons. He, too, balanced a javelin ready, and at sight of the creature before them his beavy, fulvous beard gaped open in amazement.

As for the curiosity itself, this last reinforcement daunted it. Slowly, clumsily, it backed away. They saw that it moved with knees bent, back hunched, arms banging forward like an ape's. Its eyes still turned to Hok, and it was at him it blurted a sudden guttural sound of defiance. Then, turning upon broad, flat feet, it made off with awkward speed. It dropped into a fold of the meadow, remained invisible for moments, then reappeared beyond, well out of javelin range, to plunge into a thicket.

Zhik, the youngest, recovered his high spirits first. "Gnorri!" he shouted after the fugitive, in imitation of its throaty cry. Hok laughed, and repeated, "Gnorri!" A new word was born into man's language, a word that would be used often and fearfully in days to come.

All three moved forward, tensely cautious. It was as though they expected the slain deer to spring up, alive and savage. But it was dead enough. The

Chief turned it upon its back, then drew a knife of ground buckhorn. Hok knelt to help him open the belly and peel the hide, but Zhik gazed searchingly around the horizon for long moments.

"That Gnorri left a bad stink here," announced the Chief. "Let us drag the meat away." They did so, but still smelled, or fancied that they smelled, the vanished monster.

The rest of the party came up as the butchery went on—first Asha, latest wife of the Chief, a plump, handsome young woman in a doe-skin tunic, with a naked boy-baby straddling her hip; next Barp and Unn, half-grown sons of Zhik's dead mother, carrying on their unwilling shoulders part of the camp-luggage; after that Eowi, full sister to Hok, a slim and agile maiden also loaded with bundles; finally Asha's other child, the little girl Nohda, old enough to walk but not to carry any burden save her clout of hare's fur and a necklace of red seeds. As these arrived, they helped in cutting up the meat. Under the Chief's direction the four quarters, the loin and tenderloin, the heart, the liver and the kidneys were detached and wrapped in the new hide. The ribs, head, shins and entrails remained for hyenas and ravens.

BY now it was mid-afternoon, and the party went no further than a willow-fringed creek before the Old Man uttered the laconic order "Camp." At once Hok and Zhik produced axes and cut long, supple willow poles. Several of these were thrust into the ground and bent together for central lashing. Over them Asha and Eowi drew the tent-cover of sewn hides. Barp and Unn gathered kindling and heavier wood, and the Chief reverently produced from his belt-pouch the long, charred fire-spindle. A piece of soft, punky wood served as hearth, and upon this he

twirled the spindle-point, crooning the while the ancient prayer to the fire god.

When a bright blaze had been kindled, the meat was apportioned. The Chief got, as was his right, the tenderloin. Next choice, a steak from the rear quarter, went to Asha. Hok's turn came third, and he cut slices of liver and impaled them on a green willow withe. As he put them to the fire, his sister Eowi came and squatted beside him.

"What happened?" she asked.

"None of you have told, but—"

"Gnorrl!" cried Zhik, whipping himself erect and standing at gaze.

They all saw it then, far down the stream. It had crept up to watch them, and at the chorus of bewildered shouts from the campers it now shrank back into a little clump of bushes—a broad, repulsive shagginess that blended into the leafy shadow.

Hok had dropped his liver into the fire and had sprung to where javelins were planted, tip in earth, for a quick snatch. His back tingled and crawled, in the place where, with his long-ago ancestors, a manelike strip of hair had bristled. His eyes measured the distance to the bushes. He ached to throw a spear.

Eowi came to his side again. She had rescued his dinner from burning, and was touching it with a gingerly forefinger. "I know now without being told," she said softly. "That was the danger. What was it, a man?"

"No," returned Hok, his eyes still prodding the clump. "It was a Gnorrl. Zhik made the word."

The Chief was laughing loudly and carelessly, for the sake of the frightened children. After a moment, the others joined in his merriment. Bap and Unn whooped bravely at the silent bush-clump, waving their axes and exhorting the Gnorrl to show himself and be slain.

Hok returned to his cooking, tried a lump of liver experimentally, and finally ate with relish.

BUT as the sun drew to the horizon's edge, Hok's uneasy mood came back upon him. The Chief and Zhik betrayed something of the same feeling, for they brought wood in great billets and built the small fire into a large, bright one. Hok sought serenity in toil, looking to his weapons. Did not the edge of his axe need retouching to make it sharper? With a bone chisel he gouged away a tiny flake of flint.* But this aided neither the appearance nor the keenness of the weapon. He started suddenly.

It had grown dark as he handled his gear, and he thought that something heavy and stealthy moved outside the patch of firelight. He felt as he had felt in childhood, when his mother, the Chief's first wife, still lived and told of how her dead grandfather had moaned outside the tent to be let in.

The Chief, who likewise felt the need for occupation, tightened the already perfect lashings of his javelin. "We shall sleep outside tonight," he decreed. "Zhik, too. The women and children in the tent, and a big fire kept up until morning. One of us will watch."

"Well said," agreed Hok. "I am not sleepy. I shall watch first."

It developed that Zhik was not sleepy, either, but Hok was the elder and had made first claim. The Chief then raised his voice, calling "Silence!" At this customary signal for bed-preparations, Asha, carrying her baby, en-

* The flint weapons of these early dawn men were quite excellently chiseled, done with painstaking care, and an amazing accurateness. They were far superior to the rough, crude hand axes of the Neanderthal. Their edges were sometimes razor sharp, and their shapes ranged from perfect spear tips, to a variety of axes (to which handles were cleverly attached) to slim-bladed knives and even double-edged tools.—Ed.

tered the tent. Eowi and little Nobda followed, and then Barp and Unn, who took their places at either side of the doorway. The Chief and Zhik lay down by the fireside.

Hok, left to his vigil, fought hard against the perplexing sensation of being watched. He tried to say that these were fancies. The chill at his backbone came because it was a spring night, and he had come farther north than ever before. The uneasiness was because of the strangeness. Any prudent hunter did well to watch, of course; if the Gnorrl came. . . .

It did not come, and at last he grew sleepy. The stars overhead told him that night's noon was at hand. He nudged Zhik into wakefulness, and lay down.

He dropped into sound slumber, for moments only as it seemed—then started to his feet with a wild, tremulous wail for fear and pain ringing through his head. Catlike, he commanded himself upon the instant of rousing, could see, stand and clutch at his javelin.

It was dawn. The crying came from the direction of the tent. Something huge and dark was carrying something small that struggled and screamed. The Chief, too, was there running with axe uplifted.

But a shaggy arm drove out like a striking snake. Hok saw the Chief spin and fall heavily. The Gnorrl—it was that, of course—fled with its prize.

When Zhik and Hok had gained their father's side he was dead. His skull had been beaten in, as though by the paw of a bear.

CHAPTER II

Blood for Blood

THE others were out of the tent by now. There was considerable hysterical weeping, notably by Asha, who

had lost baby and husband in almost the same instant of time. Hok, bound by racial custom not to speak to his step-mother, told Eowi to comfort the distracted woman. In the gray dawn he and Zhik reconnoitered.

A look told them everything. Strange, enormous tracks behind the tent, a slit in the hide covering—the Gnorrl, plainly, had crept up here. By guess or scent it located the sleeping place of Asha's baby son. A single strong rip with a sharp flint would give egress to a hand. The Chief, the only camper awake, had been slapped to death like a fly—the strength of the Gnorrl must be enormous. Had Hok pursued blindly, he might have died as well.

The brothers looked pallidly at each other. "You are the Chief now," Zhik said.

Hok had not thought of that, but it is true. He, with manhood barely upon him, must be leader, defender and father of this bandful. The realization steadied him, and he made plans for the space of two breaths, while Zhik waited expectantly.

"I am going to take up the trail," said Hok at last. "Stay here and bury him." He gazed down at his dead father. "Heap stones, to keep the beasts away. Then break camp. Keep your weapons in hand, and have Barp and Unn do the same. Yes, and Eowi too, and Asha when she stops crying. Be ready to fight for your lives."

"I understand," nodded Zhik.

"When you are ready to march, wait here and watch. I will make a damp-wood fire. When you see its steam, come and find me there."

Zhik nodded as before, started to ask a question, but tactfully paused. Hok knew what was on his mind, and issued a final command.

"The trail leads north. If I make no

signal by noon, you will know that I will never make signals again. You, Zhik, will be the Chief. Lead the others south."

"South?" echoed the younger brother. "Where there is danger?"

"Maybe the danger is less than what we have found."

He turned away without waiting for further comment from Zhik. He saw to his javelins, slung them in place, thrust axe and knife into his girdle. Neither speaking nor looking back, he strode quickly out of the camp, picked up the spoor of the raider and followed it at a trot.

THE footprints of the Gnorrl betokened a long, wedge-shaped sole, point-heeled and splay-toed. Its greatest weight was at the outer edge—Hok remembered how grotesquely the legs had bowed. From force of habit he gauged the length and tempo of the stride, the considerable hulk supported on these strange feet.

The sun was well up by this time, and he glanced quietly but expertly around. The country was all rolling meadow, well grown with grass and heather—rain must fall plentifully. Far to the north he saw wooded heights, from which a river wound its way. He made out distant dark spots at the brink—wild cattle drinking, and a rhinoceros or two, proof of the good hunting to be found. Upon his right, the east, ran at an angle the silver thread of the creek beside which his people had made camp, and he could descry a little ravine through which it ran to join the river.

The track before him doubled back toward the creek and into the ravine. Cautiously Hok approached, his javelin poised. He did not enter the cleft, but scouted along its lip. Where it opened at the riverside he picked up again the tracks of the Gnorrl. A gout of blood

showed beside them and, farther on, another.

The trail led him along the sand of the river's brink to where, winding upstream around a rocky height, it was lost to view. He paused a moment under the high rock before turning the corner. Breeze brought him a tiny wreath of smoke.

"The Gnorrl uses fire," he said to himself. "It cooks."

No question what cooking it did this morning. More blood spotted the track at juncture of bluff and river. Here were many footmarks of varying degrees of freshness, easily classifiable as made by three pairs of feet—two large, one smaller. Hok slipped gingerly around the point of the bank.

Just beyond the steep slope of rock curved away from the water. It made a crescent-shaped open space, tufted here and there with grass, almost entirely enclosed by the bluff and the river. At the center point of the bank's inward curve, at twice Hok's height above the sandy soil's level, opened the wide mouth of a cavern. A tall man, standing on its floor, might touch the roof by jumping, and across the opening from side to side would take four considerable stretchings of the legs. A jagged shelf extended above this grotto, filling it with shadow, and an ancient water channel descended diagonally from the cavern's lower lip to the ground, making a natural runway up which two men might mount abreast. The air was full of the musky odor Hok had first known beside the slain deer.

This was the den of the Gnorrl.

Hok's heart drummed partridge-like within him, but he advanced without hesitation. His nose curled with revulsion at the stench. He got a better view of the cavern, and from its shadowy interior came forth new wisps of smoke, laden with the smell of roasting.

He gained the foot of the runway—deep and narrow and not as steep as the bank to left and right. It was worn as smooth as Hok's palm; the feet of Gnorrls must have trod it for uncountable years. Hok set up a fierce yell, beating with his javelin-shaft on the stone.

"Hi, hi! Gnorrl, Gnorrl! Come out, baby-killer!"

He heard movement in the cave overhead. A deep rumble made reply. Hok laughed scornfully: "Gnorrl! Come out, and eat javelin!"

Something crept into view at the lip of the opening—a dark, coarse hand, matted with hair, that grasped the shoulder of rock beside the deep-worn runway. Above it peeped the low, bearded face of the Gnorrl.

It looked like the one Hok had seen yesterday, the one that had wanted to fight for the deer's carcass. This time he refused to shrink from its hiting gaze. "Come out, Gnorrl!" he urged. "Show me your body!"

As though it understood, the thing rose into view. It swung a stick abruptly; from that stick's cleft end a stone whizzed, over Hok's instinctively ducking head. The Gnorrl charged down after the missile, lumbering swift as a rhinoceros.

Hok let fly with his javelin. The upward angle was strange, but he knew his weapon. There was a bum in the air, an abrupt *chock* as the stone point drove home, and the Gnorrl fell on its face. It came sliding down the sloping way. Almost at Hok's feet it subsided quivering, blood from its gasping mouth soaking the sand.

A coughing roar sounded from above, where another Gnorrl had appeared. This was a female, almost as thickset and fearsome as her fallen mate. She saw at once what had happened. Her voice shrilled into a scream as she

dashed vengefully down the narrow way.

Hok snatched his second javelin from behind his shoulder, but there was no time to flex and throw. He quickly planted the butt-end in the sand, dropped to one knee, his right hand supporting the shaft at an angle. Even as the she-Gnorrl launched herself through the air, her great hands crooked like talons for the grapple, he point-blanked the flint head into the center of her gross breast. The force of her own assault impaled her, and Hok, releasing the javelin, sprang lightly to one side. She floundered down, the blood-gushing point springing into sight between her bairy shoulder blades. Hok caught hold of the shaft just at the lashings and with a wrench pulled it clear through her body.

She still lived, trying to squirm around and clutch his ankle. He danced away, laughed, and stabbed through her eye into the brain. As she sagged into death he freed his javelin a second time and sprang across the carcass of the male to mount upward to the cave.

Inside the dark chamber crouched a halfling male cub of the Gnorrls. Its frightened face was greasy with eating, and one hand clutched a gnawed morsel. Hok darted a glance at the fire and the interrupted cooking. That one glance was enough. He set foot on the floor of the grotto, watching the young Gnorrl.

It chattered at him like a crazy monkey. Monkeylike, too, it was fuzzy of body, nervous of movement. Hok chuckled harshly. The young Gnorrl understood, tried to retreat. In a far corner of the grotto opened a small inner cave. Hok let the thing win almost to that hiding; then, still chuckling, he darted his javelin.

Just before noon, called by Hok's damp-wood smoke signal, Zhik and the

others arrived. They found their new leader seated at the foot of the runway, scrubbing his weapons with sand.

"The Gnorrls are dead, all," he told them. "I have thrown them into the river."

"Is this their cave?" asked Eowi, her eyes round.

"No," replied Hok. "It is our cave now. Get green wood, to burn and drive away their smell. In this good game country we stay."

CHAPTER III

Skirmishing

THE grotto, with its water-worn sides and floor of hard-trodden earth, was more than large enough for all the surviving members of Hok's family. In odd corners the new tenantry found the possessions of the slain Gnorrls. Near the runway were heaped throwing stones, to be flung by hand, or with a cleft stick, as Hok had seen and survived. A horizontal crack, like a natural shelf, held other stones, rather roughly chipped into tools and weapons. These included bide-scrappers that Asha and Eowi appropriated, also several almond-shaped flints, like helveless axes, to be beld in the hand.

Gnorrls, too, were learning something about the weapons of the strangers. On the morning after the first night in the cave, Zhik went for a brief scout down river and returned to say that Hok's three victims had washed ashore in the shallows not far away. Barp and Unn slipped off to see the corpses, and returned shuddering. From the shelter of a willow clump they had seen half a dozen living Gnorrls moaning sadly over the dead. Eventually, said the frightened boys, these grotesque mourners had carried the bodies away.

"They are like men," commented Zhik. "They weep for the slain and take

them away to bury them. The Gnorrls worship."

"They are evil," growled Hok, and dutifully boxed the ears of Barp and Unn, warning them to avoid all contact with Gnorrls.

Other clues to Gnorrl-life turned up in the cave, and from them Hok and Zhik deduced that the shaggy people lived in rock-sheltered communities during winter, rather wretchedly and scantily. Warm weather would set them roving in small groups again, even as true men loved to do. It had been only chance that the last three Gnorrls idled in these winter quarters.

If this was an established stronghold of the things, they would want to come back, and there would be trouble; but Hok felt that the odds lay with the defenders. The Gnorrls would have to gather upon the open half-moon of sand below, in fair view and could scale the runway only a pair at a time. The ledge above the grotto precluded attack from that quarter. Wisdom and watchfulness would do the rest.

Accordingly the young chief announced that whenever he and Zhik were absent, Barp and Unn must keep faithful watch at the river's brink, where they could see up and down stream, while the women beld themselves ready at all times to burl spears or stones against attackers.

THE next adventure with Gnorrls was Zhik's alone. He and Hok, hunting, for meat, went in opposite directions across a plain on which grazed deer and cattle. When the brothers met later in the day, Zhik was minus a javelin and trembling with rage and excitement.

He had stalked a wild cow, crept through high grass and pierced her heart with a javelin. Then, before he could come up to her, the nearby thick-

ets had vomited Gnorrls, and he had been forced to run for his life.

It was the last lone hunt of either young man for many months. Not only did they roam together thenceforth, but they made more preparations at the cave. From leg bones of deer and bison they cut serviceable points, which they bound to straight shafts. Thus they made plenty of good javelins for throwing or stabbing. These they stacked near the runway, ready for instant use. Hok instituted target practice for Barp, Unn and the women.

But the feared attack did not come until autumn's frosts made the mornings white. It was then that the Gnorrls tried to take back their ancient shelter.

They made a rush early in the dawn. Only Asha was awake, and had gone down to fill a skin water-bag. The hairy ones were upon her in a triumphant, yelling wave. Even as Hok and Zhik started to wakefulness on their pallets at the lip of the grotto, they saw their stepmother beaten to death with stones and ragged clubs, and her limp body dragged backward out of sight beyond the shoulder of the bluff.

The girl Eowi, who had been on guard but had gone into the rear of the cave, rushed back and hurled the first vengeful missile. It was one of the bone-tipped javelins, and it split the broad face of a Gnorrl as he gained the very foot of the runway. He sat down, howling through a sudden mask of blood, and his blind wriggles blocked for the moment a concerted charge. Meanwhile the open space below seemed thronged with the enemy, and into the heart of them Hok and Zhik threw spear after spear. No need to take careful aim at such close quarters; four of the besiegers were down in as many breaths, and the rest gave back. The occupants of the cave shouted their defiance, and Barp threw a lucky shaft

that pierced the shoulder of a Gnorrl slow in retreating. Screaming loudly, the wounded monster sprang into the water and wallowed there. Again the cave-holders yelled, as at a good omen.

Five human battlers were in action—Hok, his three brothers and Eowi. The Gnorrls numbered six times as many, and seemed to have some sort of attacking order. One or two growled commandingly, and made gestures as if to show how few were the enemy. A volley of stones splattered the defenders, and Unn yelled in startled pain. There was another dash for the runway.

This time it was almost taken. Barp, Unn and Eowi threw their javelins too quickly and, although the casts took toll, a flood of Gnorrls came scrambling up the narrow channel in the rock. Hok and Zhik, who had reserved their casts, now skewered each his Gnorrl, but the others swarmed over the fallen and up to the very level of the cave floor. It looked like defeat, destruction. Desperately Hok slashed with his axe of flint, hewing down the foremost attacker. Then it was Eowi who turned the tide of battle.

She had snatched a blazing stick from the breakfast fire, and ran to thrust it into the snarling face of the next Gnorrl.

That move was genius, or luck, or both. Had the Gnorrl been killed outright, he would have fallen, and his comrades behind rushed trampling over his body to the conflict. But as the flame kindled his rank beard, there went up from his great mouth a hideous howl of pain and terror. He toppled backward on the slope of the runway, flung out his thick arms and grappled those behind him. Crazy with fear and agony, he tried to fight his way back through the press. Two or three other Gnorrls slipped and fell. Zhik, greatly daring in his extremity, sprang upon the

fallen bodies, spurning them with his moccasined feet and thrusting with a javelin at those beyond and below. A moment later the whole attack was demoralized and the Gnorrls, dragging some of their wounded, fled wildly back to the river, then along the edge and out of sight beyond the bluff.

Hok and his people waited cautiously while the morning sun lifted itself in the sky by the breadth of a band. Then they descended to the ground and reconnoitered. The Gnorrls were not to be seen up or down river, nor on the meadow below the bluffs. On the sand lay nine of the creatures, dead or dying. Three of these had fallen upon the runway and had slid to its foot. Hok and Zhik finished the last struggles of the wounded with judicious axe-blows and hurled the bodies into the river, where they drifted quickly away.

The only loss on the side of the defenders was Asha, whose corpse had been borne away by the retreating Gnorrls—for what purpose Hok well knew. He grimaced in revulsion at the idea, but reflected that his stepmother's flesh was a repast dearly bought. Lesser mishaps were a deep cut on his own cheek, which he could not remember sustaining, a wrenched ankle for Zhik, and a big bump on Unn's forehead from a flung stone.

THE following day a heavy snow fell, and the Gnorrls menaced them no further. Undoubtedly the strange aborigines of this northern meadow-country found another shelter from the cold. Once or twice, when hunting on fair days for snow-bogged elk and bison, Hok and his brothers saw Gnorrls at a distance and were interested to see that the natural shagginess of the things was augmented by crude mantles or skirts of skin. However, there was no more fighting, no close contact even, during

all the season of snow.

Several times in midwinter the cave-dwellers found themselves on the shortest of rations, but all of them were young and vigorous, and all lived to see the spring.

Hok, sauntering southward with Zhik, saw something else.

"Smoke," he pronounced, pointing afar in the direction whence they had come a year ago. "Fire—of men, like ourselves." He looked at his brother sidewise. "You can be chief for a time—and Barp and Unn have grown. They can help hunt and guard."

"Why do you talk like this?"

"I am going south," replied Hok. "Where there are men, there will be women. I want one."

CHAPTER IV

The Capture of Oloena

IT was one of the smallest pools in the wide, dense-grown forest, a blob of shiny dark over which boughs and vines laced greenly. The girl turned over lazily upon its quiet surface, swam three strong, slow strokes to the brink, and waded out.

Her golden, glistening body, its curves at once strong and graceful, would have intrigued even critical modern eyes. She shook herself, like the handsome wild thing she was, and drops showered from her like rain. Then she donned her single garment of soft doeskin, that looped over one round shoulder, covered her young bosom's swell, fitted her waist and dropped like a short skirt to mid-thigh. Her slender feet slid themselves into sandals of well-tanned bison leather. On her right arm she fastened a sort of bracelet, strung out of small gay shells. Finally she rummaged in a belt-pouch, brought out a shallow-toothed comb of deer-bone and, leaning back against a half-rotten

stump, began to arrange her great, damp cloud of blue-black hair.

Oloana, daughter of Chief Zorr and beloved of his giant lieutenant, Kimri, feared nothing. The huntsmen of her little tribe had long ago driven the beasts before them, even in this northern edge of the forest. As for human menace, who would dare so much as look at her, for all her new ripeness of beauty?

Yet someone was looking. He lounged easily in a tree-fork overhead, lithe and motionless as a leopard in ambush. Unlike Oloana's dark folk, he boasted a head of hair the color of a lion's mane. His face, clean of beard, was ruddy rather than sallow brown, and a scar across one young cheek added sternness to his undeniable good looks. He wore moccasins instead of sandals, and the fashion of his axe, dagger and javelins was strange to the people of that forest. He was Hok, who had come south to find a woman.

His gray fighter's eyes sparkled with honest relish, and his wide mouth spread wider in a grin of approval. His big hands opened and closed, as though eager to seize what he saw. Noiselessly he rose erect on his perch, twitching a javelin from his shoulder-loop. The long shaft whizzed in the air, and thudded into the stump beside the girl.

Oloana screamed in panic, tried to spring away—in vain. The sharp flint point had pinned fast the edge of her skirt. Even as she struggled to tear loose, a happy laugh rang out above her. A long-limbed, bright-maned demon fell out of the branchy heavens, lighted easily upon moccasined toes, and caught her by the elbow.

"You are mine," he announced, in a language similar to her own.

She screamed again, and struck at him. Her fist rang on a chest as hard as wood. He laughed the louder, plucked

away the tight-wedged javelin as easily as Oloana would have gathered a wildflower. Still struggling and shouting in fear and rage, she felt herself whirled lightly up and across his shoulder. Then he ran.

For another, deeper shout answered Oloana's appeal, to be echoed by more shouts. Her people, the dark forest men, had heard her and were coming. Hope came to the girl and added fire to her battle for freedom. Hok chuckled and fled the faster.

Still more loud came the pursuing cries. Racing figures could be seen among the thickets behind—black beads and brandished weapons.

"No javelins!" bellowed one great voice, the voice of Zorr, Oloana's chieftain father. "You might kill her. Run him down!"

"We have him!" howled back the gigantic Kimri, who was to marry Oloana. "He's running toward the ravine!"

It was true. A narrow, ancient creek had cut deeply into the loamy floor of the forest, and there the ravisher must perforce come to bay. Oloana ceased her cries, fiercely exulting over the imminent reckoning. She heard Hok's sharp gasp of surprise as he spied the ravine, a good five times the length of a man across, and nearly double that in depth.

But he did not slacken his pace. Once more the stolen girl screamed, screamed in new and mortal terror, as Hok raced to the very rim of the chasm and sprang out over it.

For one heart-smothering moment Oloana stared down at the rock-torn current far below. They must fall; he crushed—but her captor's free hand had seized a dangling vine. Their weight carried them flying onward, upward, while the far bank rushed to meet them. Hok's feet found the brink,

clutched solid footing, and he paused to look back.

The black-beards were lining the other bank, cursing and raving. Several lifted their spears. Hok laughed and swung Oloana's body before him.

"Do not throw!" commanded Zorr anxiously. "Cross after him!"

"None of you dare the leap," taunted Hok.

"I will follow!" screamed Kimri, towering among his fellows.

"Follow, then," laughed Hok, and plunged anew into the forest, dragging Oloana by the wrist.

FOR eternities, it seemed, he urged her to match his tireless lope. She ceased to struggle and drag backward—her strength was nothing to his. They came into strange country, beyond the northernmost limits of Zorr's latest northern foray. Just as the girl wondered if her captor would never grow weary, he came to an abrupt halt.

They stood in a little clearing among hitches, with a trickle of water crossing it and, to one side, a rocky hummock with a yawning cave entrance.

"We camp here," said Hok, Oloana's eyes threw black hate-fire, and her bosom heaved as she probed her mind for names bad enough to call him.

"You dared steal me!" she flung out.

"You are a woman," he replied, as if that explained everything. "I am a man. My name is Hok."

"A man?" she echoed scornfully. "With no beard?"

"With my people, men without mates pluck out their beards. Now I shall grow mine."

Her voice trembled with rage and contempt. "You have the face of a boy. Kimri will crush your skull like a toadstool."

"Let him try," said Hok. "Come into the cave."

"I won't."

He lifted her from her feet and carried her in. She screamed once more, though help was far away, and her flying fists glanced from his chest and face like hailstones from a cliffside. Setting her carefully upon the floor of the cave, he barred the door with his own great body.

"You are beautiful," he informed her.

"What is your name?"

She sprang at him and bit his shoulder. Snorting, he pushed her away.

"We had better rest," he decreed.

"Both of us."

Deep night found a fire blazing at the cave-mouth. Hok had speared a grouse in the clearing, and was grilling it on a twig. When it was done, he offered the choicest morsel to Oloana.

She shook her head, her eyes bright with tears. "When will you let me go?" she pleaded for the hundredth time.

"I have said that you are mine. I am a chief in the country to the north. We will go there."

"Go there?" she repeated. She began to edge toward him.

"What is your name?" demanded Hok once more.

"Oloana," she breathed, coming closer. He gazed in happy surprise.

"Oloana. That is a beautiful name. When we—"

Out flew her hand. She caught one of his javelins from where it leaned at the entrance to the cave. Whirling it, she plunged the point straight at her heart. Hok's hand, still clutching a shred of his supper, flew a thought more swiftly. The deflected point glanced off across the base of Oloana's throat, leaving a jagged thread of crimson. A moment later Hok twisted the weapon from her hand.

"You might have killed yourself," he scolded.

She burst into new tears. "I hate

you. As soon as you let me go, I will try again."

Hok took from his shoulders the javelin-strap. Pulling her wrists together, he bound them.

"My feet are free," she cried and, springing up, darted from the cave and leaped across the fire. Before she had run half a dozen steps he overtook her and dragged her back. This time he bound her ankles with his girdle-thong. She lay helpless but tameless, and glared. Hok hugged his knees and studied her with worried eyes.

"I wanted you the moment I saw you," he said plaintively. "I thought you would want me, too."

She spat at him, rolled over and closed her eyes.

"Sleep then," he conceded. "I shall sleep, too."

In the morning he woke to find her propped upon bound hands, her eyes turned unforgivingly upon him.

"Let me untie you," he offered at once.

"Do," she urged bitterly. "Then I can kill myself."

"You must be thirsty," he said. "I will bring some water."

In the clearing he plucked a dried gourd from a spreading vine. Deftly cracking it, he cleansed the withered pulp from one cuplike piece and filled it at the stream. Carrying it back, he offered it to Oloana. She neither moved nor spoke, but when he held it to her lips she drew her head away.

"You do not eat or drink," he said. "You will die."

"Let me die, then."

Hok gazed at her perplexedly. Things were not going as he had hoped. What would life be like, with a sullen, vengeful woman who must go always tied lest she run away or kill herself? Suddenly Hok saw an awful vision—Oloana still and voiceless, with blood

flowing from her heart where nested his javelin. So vivid was the mental picture that he dashed the back of his hand to his eyes.

"I hate you," Oloana snapped at him.

He rose and stooped above her. His hands caught the leather that bound her wrists, his muscles suddenly swelled, his breath came in a single explosive pant. The cord broke. Bending, he hooked fingers under the thong at her ankles. A heave, a tug, and that, too, tore apart.

"Run away," he bade her dully.

She rose to her feet, amazed.

"I thought I had you," he tried to explain, "but, even when you were tied, I did not have you." His brow creased at his own paradox. "You hate me. Run away."

"You don't want me now?" she challenged him.

His hands grasped her shoulders. Their faces were close to each other. His stare fastened upon her sulky mouth, as full and red as a summer fruit. How sweet that fruit would taste, he suddenly thought. His face darted down upon hers, their lips crushed together for a whirling moment. Clumsy, savage, unpredicted, it was perhaps the first kiss in human history.

Still more abruptly, Hok spun and fairly raced out of the cave, out of the clearing, into the forest away from Oloana's black eyes and fruit-red mouth.

CHAPTER V

The Capture of Hok

BUT he did not run far. Somehow it had been easier to run yesterday, even when encumbered by the struggles of Oloana. Hok lagged. His troubled young eyes sought the ground. His feet took him where they wished.

The day and the distances wore

away, like rock under falling water. Hok did not eat. Twice or thrice he drank at singing brooks, then spewed out the water as though it were brackish. Once he saw a wild pig rooting in a thicket and by force of habit reached back for his javelins. Then he remembered that he had left them leaning at the door of the cave. He had left Oloana there, too. He could get more javelins, but never another Oloana.

It was nearly evening. He walked slowly down a game-trail, less watchfully than he had ever walked since childhood. Before he knew it, something buge and swarthy flashed from behind a broad tree-hole and flung itself upon him.

On the instant Hok was fighting for his life. One glimpse he caught of that distorted, black-bearded face before they grappled—it was Kimri, the giant who had sworn to follow him and take Oloana back. He was an adversary to daunt the bravest; but Hok had faced Gnorrls, which were more horrible. Smaller but quicker than Kimri, he locked his arms around the huge body in a python-tight underhold. His tawny head burrowed with canny force into Kimri's shaggy cascade of black beard, driving under the heavy jaw and forcing it upward and back.

The dark forest man's huge muscles began to sag as Hok increased the leverage. Hok's beel crooked behind Kimri's, Hok's entire weight came suddenly forward. Down they went with a crash of undergrowth, Kimri beneath, while his lighter opponent's oak-hard fingers drove through the beard-tangles, finding and closing upon the throat beneath.

But a flurry of feet drummed down upon them as they strove on the ground. Two sinewy hands clamped under Hok's chin from above and behind. He bit a finger to the bone, heard his new

assailant bowl, and next instant was yanked bodily away from the prostrate Kimri. As he tumbled he tore free, whirled catlike to get his feet under his body, and rose swiftly to face a second blackbeard, shorter and older than Kimri. But something darted forward to quiver a thumb's-breadth from his heart—a long, lean dagger of chipped flint.

"Move!" the newcomer dared him. It was Zorr, Oloana's chieftain-father. "Move—and die!"

Hok stood motionless. Kimri struggled up, wheezing and cherishing his bruised throat with shaking fingers. He gulped welcome air into his great lungs, then seized his fallen axe.

"No!" harked the father of Oloana. "The rope!"

At the voice of authority, Kimri dropped his axe and jerked from his girdle a coil of rawhide line. Quickly he flung a loop of it over Hok's shoulders and ran the rest of it round and round, pinioning the prisoner's arms to his body.

The chief lowered his dagger. "Where is Oloana?"

Hok shook his head.

"Answer!" roared Kimri, and struck Hok's mouth with his horny palm. Blood sprang to the bruised lips as Hok curled them in scorn.

"Coward's blow," he mocked. "Untie me, and I will take the head from your body like a berry from a hush."

"Where is Oloana?" demanded Zorr again.

"I do not know. I set her free."

"You lie," raged Kimri. "Tell us where you have hidden her."

"I say that she is free," insisted Hok.

"Tell us," Kimri repeated, "or we will kill you."

"You will kill me anyway," said Hok.

Kimri's beard bristled, and again he

clutched his axe. As before, the chief intervened.

"It is nearly night, Kimri. We will camp. He can think until morning." He studied Hok narrowly. "Tomorrow, if his mouth is still empty of the words we want, we will stuff it with hot coals."

Kimri grunted acquiescence, and the two herded their prisoner through the trees for nearly a mile. In a grove at the top of a hrush-faced slope they came to a halt, shoved Hok violently down at the base of a big tree and tethered him between two gnarled roots with the free end of the rawhide. Then Zorr kindled a fire with rubbing sticks, chanting a ritual similar to the one Hok's people used. The forest men produced fitches of dried venison from their belt-bags and began to eat, talking in low tones.

Darkness came. The two dark men stretched and yawned. Kimri rose, larger than ever in the fireglow, and came to the big tree. He examined the knots in the cord and gave the prisoner a kick.

"Tomorrow you will talk," he prophesied halefully, and returned to the fire. Zorr built it up with hard wood. Then the two lay down and fell into quick, healthy slumber.

HOK listened until the men by the fire began to breathe regularly and heavily. Then he tried his bonds, cautiously at first, lastly with all his strength; but the rawhide had been passed many times around him, and was drawn tight. He could not make it so much as crack.

Forced to lie still, he thought of Oloana and her resentful beauty, of how he had not tamed her. With the dawn his enemies would awaken and question him again. Zorr had hinted of fire-torture. He, Hok, could truly tell them

nothing, but they would never believe. If he were lucky, he might goad them into finishing him off quickly.

He dozed fitfully at last, but started awake almost immediately. What was that? . . . He felt, rather than heard, the stealthy approach of light feet. The ash-choked fire suddenly cast a bright tongue skyward, and Hok saw the newcomer—a woman, crowned with clouds of night-black hair. Oloana had tracked him down.

She bent to look at Kimri, at her father. Another tongue of flame rose, and by its brief glow she saw where Hok lay. Immediately she tiptoed toward him. Her right hand lifted a javelin—his javelin, brought from the cave.

Kneeling, she slid her other hand across Hok's chest to where his heart beat, beneath two crossed strands of rawhide. He looked up into her deep eyes and grinned mirthlessly. If she but knew how she was cheating her father and her lover, if she could foresee their rage when they would find him slain and beyond torture! The flint point came down. He braced himself to meet it. Then—

The rawhide relaxed its clutch upon him. A strand parted, another and another, before the keen edge of the javelin-point. He was free. Wondering, he rose to his feet, chafing his cramped wrists and forearms. Oloana, close to him in the dim night, cautioned him to silence with a finger at her full lips. Then she beckoned. Together they stole away toward the edge of the hluff.

Oloana, going first, hrushed against leaves that rustled. A roosting bird squawked in sleepy terror and took noisy flight.

Next instant Kimri's awakening roar smote their ears. Oloana ran like a rabbit down the slope, while Hok swung around to meet the clumsy rush

of his late captor. A collision, a clasp-hug, and again the two who wanted Oloana were straining and heaving in each other's arms. Loose earth gave way beneath their feet. They fell, rolled, and went spinning over and over down the declivity.

At the bottom they struck with a thud, flew sprawling apart, and rose to face each other. The giant hung back from a new encounter, his hand groping for his dagger-hilt. But then he flinched and stiffened. In the gloom, Hok fancied that the wrath on the hairy face gave way to blank surprise. A moment later the huge form pitched forward and lay quivering.

Oloana, revealed behind him, wrenched the javelin out of his back. She made an apologetic shrugging gesture with her shoulders.

"I knew that you would win," she stammered, "but I—wanted to help."

From the trees above rang Zoor's shouts for Kimri. Hok extended his hand for the javelin, but Oloana held it out of his reach.

"No," she pleaded. "He is my father. Let us run."

TOWARD dawn, back at the cave where they had parted, Hok again coaxed fire from rubbing sticks. In its warm light the pair relaxed, their shoulders to the rock.

"Oloana," Hok now found occasion to ask, "why did you follow me? I thought—" He paused.

"Yes," she nodded shyly. "I, too, thought I hated you. But, before you left me, free and alone, you—" she, too, fell silent.

"What was it?"

"This." Her round arms clasped his neck. His lips groped for hers. It was, undoubtedly, the second kiss ever to be achieved.

"Tomorrow we start north," he said,

after a time. "My people are there. You will like my brother Zhik, and my sister Eowi." He frowned. "Yet there are things you will not like. The Gnorrls."

"Gnorrls?" she repeated. "Are they animals?"

"No. Not animals."

"Men? Evil men?"

"They are not men, but they are evil. Like the spirits that trouble sleep."

"I shall not fear them," she said confidently. "You, Hok, will fight and kill them."

"Yes," he agreed, "I will fight and kill them."

Then he paused, wondering how he would manage it.

CHAPTER VI

The Capture of Rivv

HOK and Oloana had not much time in the days that followed to discuss or dread the Gnorrls. As a matter of fact, Hok forgot the creatures, as much as any man could forget, having once encountered them. But when, in sight of the familiar plain and the bluff-hound river he saw on a ridge a cautiously peering hulk that was neither beast nor man, the old hate and revulsion came to him—came almost as strongly as though for the first time.

It was then that Hok, clutching Oloana's wrist with a crushing strength that surprised even her who had seen him grapple the giant Kimri, half growled and half quavered a command never to stand, walk or sleep without a weapon in reach; never to relax guard; never to stir from the home shelter alone. Oloana then knew that if her mate feared anything, it was the unspeakable Gnorrl. Solemnly she promised to obey and strictly she kept that promise.

Approaching the old rock-defended

camp by the river, Hok's trained eye glimpsed footprints that told him of the presence of his kin. When he and Oloana drew into sight at the narrow entrance between rock and water, young Unn, who was standing guard, first sprang erect with poised javelin, then burst into an uproar of welcome. Others dashed into view—Eowi, Barp and Nohda, all larger and lovelier to Hok's sight than when he had left them. There was a gay reunion in the open space before the cave; Hok introduced Oloana, with the simple declaration that she belonged to him and must be respected as much as his own right eye. Eowi smiled shyly but winningly at the stranger girl, and cemented a new friendship with a present—the finest of the scrapers captured from the Gnorrls.

When the first hugs and shouts had subsided a trifle, Hok suddenly stiffened to attention. Two figures—living human figures—crouched in the shadow of the rock.

"Who are these?" he demanded at once.

"Oh," replied Eowi, with the carelessness employed in speaking of chatels, "Zhik found them."

"Zhik?" Hok had missed his brother. "Where did he find them?"

"Here he comes," interjected Barp. "Let him tell."

Zhik trotted into view, bearing the hide and choicest parts of a slaughtered goat. He whooped at sight of Hok, and the two exchanged affectionate fraternal roars and buffets. Then came once more an introduction of Oloana, and finally Zhik's explanation of the strangers.

He called them to stand forth—a middle-aged man with a great slate-colored beard, and a slim young girl, several years Eowi's junior and as dark in complexion as Oloana. The man's name was Kaga, and the girl was his

daughter, Dwil. Zhik considered them his property, by right of discovery, capture and defense against the Gnorrls.

"Two days after you left," he told Hok, "I was hunting, and saw four people—these two, another man and an older woman. I did not know if they were friends, and I kept out of sight. They were new in the country, for they did not watch for Gnorrls. Before they knew it, Gnorrls had risen out of the grass and bushes—nine." He held up that many fingers to illustrate.

He went on to say that the second man, foremost of the quartet of strangers, had been seized and literally plucked to pieces by three Gnorrls—his arms and legs had come away in those terrible paws, like flower-petals. The others ran. The oldest woman had gone next, being overtaken by two of the pursuing monsters, and had died under their rain of blows. Before the last two could win to safety, a stone hurled from a Gnorrl's cleft wand knocked the gray-bearded man down. His daughter had rallied beside him, facing hopeless odds. She meant, it seemed, to die in his defense.

"But the Gnorrls did not know I watched," continued Zhik, a trifle complacent in memory of his scouting skill. "I jumped up, and let them have both javelins, one after another. I wounded two. A rock came my way, but it went to pieces in the air, and it only cut me." He laid a finger on his temple. A scar showed, that had not been there when Hok had left. "After that the girl—Dwil—threw her javelin, and it went through a Gnorrl's arm. That was three down in less time than I have told it; the others ran before they were well aware of what had happened, and carried away their wounded and the two they had killed."

He told how he had gone up to the fallen man and the girl. She had been

most suspicious, and drew a stone knife, which Zhik took away from her. Then, as her father regained consciousness, Zhik possessed himself of their other weapons and obliged them to return with him to the cave. There they had been assigned most of the community chores — wood-carrying, water-fetching and so on.

Hok talked to Kaga, whose language like Oloana's was understandable. He learned that the unlucky four had been searching, as had Hok's own people a year ago, for new and uncrowded hunting grounds. They had friends, far to the south and east, who waited for them to return and report.

"You have friends?" Hok repeated. "You will stay here." For he knew that the Gnorrls would be quite enough to fight at one time; he wanted no human adversaries in the neighborhood.

"Yes, you will stay here," seconded Zhik. Then he looked at Hok, at the manifestly happy Oloana, and finally at Dwil, who lowered her eyes. Zhik muttered to his brother: "I want to ask you something."

"Wait," said Hok, with all the authority he could muster. His own courtship of Oloana had been so brief as to be almost instantaneous, and he had by no means repented at leisure; yet he wanted to be sure before advising Zhik, or permitting him to mate with this captive girl.

"You are growing a beard since you got Oloana," Zhik added. "It looks well."

"Wait," said Hok again, and his brother sighed dolefully.

HOK asked to hear more about the Gnorrls, and learned that they were more numerous by far than a year ago. Not a day passed but what Gnorrls were sighted, sneaking through thickets or among boulders, watching

all that their human foes did, but seldom offering fight. Zhik did not like this, nor, when he heard of it, did Hok.

"They are planning something," said the older brother. "They care for their dead—that means that they worship, as we do. If they worship, they think. And they are many, where we are few."

It was early in the summer that Barp and Unn, rambling together in search of marmots, came back in a scamper to gasp out what they had seen—a group of Gnorrls overpowering a human stranger. He, a slim youth whose budding beard was dark, was patently unused to Gnorrls. They had stalked and surrounded him almost effortlessly. But the novelty of the tale was the forbearance of the captors. Instead of tearing their prey to pieces, they had bound him with long strips of tough bark and dragged him away northward. Hok frowned and pondered. Then he asked Barp and Unn if this was not a joking untruth.

Both lads protested earnestly, and offered proof of their adventure. Unn, stealing in the wake of the Gnorrls and their prize, had picked up something that might have been torn from the man's belt during the brief struggle—a pouch, made of striped catskin. Hok took the article, opened it and made an inventory. There was a hank of split-sinew thread, three or four flint flakes, a bone awl ground to a slender point, with a spiral line incised around it. At sight of this last item, Oloana cried out sharply and ran to clutch at the splinter of bone.

"My brother!" she exclaimed.

"What?" grunted Hok. "What about your brother?" Zhik and Eowi both came near to listen.

"It is his," replied Oloana. "I made the awl for him. The man the Gnorrls took is my brother—Rivv, the son of Zorr."

Hok pursed his lips. "He must have followed us here. He should have kept his eyes open."

"The Gnorrls did not kill him," said Barp again. "I wonder what they will do with him."

Oloana was looking only at Hok. "Go," she said suddenly. "Follow him."

"Huh?" ejaculated her husband. "Follow your brother?"

"See if you can get him away from the Gnorrls."

That began a discussion that did not end with supper or with bedtime. Hok pointed out that Rivv had come north to avenge himself on Oloana's abductor—which meant Hok; Oloana answered that Rivv meant only to help her. Hok argued that the Gnorrls probably had killed Rivv; Oloana made reply that, had they intended to do so, they would not have bound him and carried him away. Hok complained that Rivv was of a strange and enemy people, and Oloana flashed back with considerable heat that she herself was of that same race.

The night long there was little sleep for anyone within earshot of the two, and in the morning the debate came to a conclusion that feminists might regard as epoch-making—the woman had her way. Hok made over temporary command to Zbik, took his weapons and a few slices of dried meat, and left camp to follow the brother of Oloana.

CHAPTER VII

Rescue from the Gnorrls

HE picked up the trail where Barp and Unn had said he would. It was easy to trace, and as he went northward he saw, in one or two spots, the clear-made tracks of the Gnorrls. Among them were the distinctive narrow prints of a true man's foot.

Thus guided, he crossed a little range

of hills and came late in the afternoon to a place where a year ago he had mentally set up the boundary of his hunting grounds. A sloping height rose beside the river that poured down from the north, and to the west were trees. Between the rising ground and the river at the east was a very narrow strip of sandy beach that had once been part of the river bottom. At the southern end of this strip lay a long jumble of boulders, washed there in ages past by a greater river, now choked with sand and coarse weeds.

The Gnorrls had taken this low, narrow way and he followed them, observing as he did so that the water had once risen here to considerable height, but that it had fallen and now ran swiftly in its narrow channel, almost in rapids. Emerging from the pass, he saw that the northern face of the rise fell nearly perpendicularly, and that beyond a small meadow began semi-wooded country, with thickets and clumps of trees and brush.

At that time Hok may have been close upon the heels of the Gnorrl band, which would be hampered by its prisoner; but he went no farther into strange country, camping before sundown on the sand at the northern end of the tunnel between river and height. The next morning he resumed his hunt, but moved slowly and with a caution that may have been greater than was necessary. Thus, he did not approach bushes, groves or other possible hiding places of Gnorrls without an examination from all sides. His second night out from home he spent without a fire, climbing a tree for safety from possible wolves or cave-lions. The following day he spent in a treacherous and foggy swamp, and barely emerged before it was nightfall again. This time he camped in a sort of hurrow made by the uprooting of a great tree, and in that

shelter be dared built a fire.

Dawn almost brought disaster, for it was a fearsome scream that brought him instantly erect, awake and alert as the wild instantly are, to face the leap of a tawny, spotted sabertooth.

He had no time to more than seize his javelin, drop to one knee, and present its point to the charging monster.

Braced against the ground behind him, it impaled the great cat from breast to spine.

Scrambling from beneath its great weight, he wrenched his spear from the carcass and then stared down in awe. Fearsome things in this Gnorrl country.

AT noon of his fourth day he moved cautiously over an open plain, sparsely covered with grass and beather, and bearing scant sign of game. It was a poor country up ahead, he guessed, and he could not blame the Gnorrls for wanting back the pleasant territory he and his were now holding.

The lips of a valley lay northward, apparently formed by a curve of the river on a lower reach of which his people camped. Toward this depression led the tracks of the Gnorrls he followed—they must be within it. At once he dropped down and began an elaborate creeping approach, flattening his long body in the beather. After a time he saw a Gnorrl, then several more, emerge from the valley and strike off westward, as if hunting. He waited for them to get well away, then resumed his lizardlike advance.

The sun dropped down the sky, and down, as Hok drew nearer to the valley. He paused at last—he heard a noise, or noises. That was the kind of noise made by many throats and tongues; more Gnorrls must be in the valley. At length he won to the brink,

gingerly parted a tussock of flowered stalks, and gazed down a rocky incline upon the floor of the valley.

It was full of Gnorrls.

The steeps that made up this slope of the valley fringed a great rounded level space, a sort of vast enlargement of the guarded camp ground which Hok's own people had taken from the Gnorrls. In ancient times the river had been bigger and wider up here, too; this had been a bay or even a lake. Now a big dry flat was visible, and this unlovely people gathered upon it, to make fires and rubbish-heaps and stench.

The Gnorrls sat, singly or in family knots, around small, ill-made hearths. Some of them toasted bits of meat on skewers of green wood, some clipped and knocked at half-finished flints, women chewed the fleshy surfaces of hides to soften and smooth them. Little Gnorrls, naked and monkeyish, romped and scuffled together, shrilling incessantly. Some of the old males grumbled to each other in the incomprehensible language of the race, pausing now and then to wag their unshapely heads as though in sage agreement. Over all went up an odor, so strong as to be almost palpable, of uncleanness and decay and near-bestiality—an odor that had something in it of reptile, of ape, of musky wolf, as well as something like none of these.

Hok tried to judge how many there were. Like most intelligent savages, he could count up to a hundred—ten tens of his fingers—but beyond that was too difficult. There were more than ten tens of Gnorrls, many more. With something of a pioneering spirit in mathematics, Hok wondered if there could not be a full ten of ten-tens; but there was not time to count or add or compute, even if he could marshal the figures in his head.

Thus he estimated the situation, as a good hunter and warrior should, half instinctively and almost at first sweeping glance. His second glance showed him the specified item he had come to note and to act upon.

Close to the foot of the declivity, but well to the left of where Hok was peeping down, stood a little gathering of Gnorrls, all full-grown males, and in their center a tall figure. This one had a smooth dusky skin, a lean body, an upright head with a black young beard—Rivv, no other. He stood free, though Hok thought he could make out weals upon chest and arm that bespoke recently-loosened cords. One big Gnorrl held Rivv by the wrist. Another held out something to him.

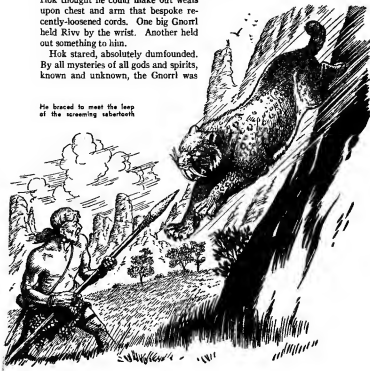
Hok stared, absolutely dumfounded. By all mysteries of all gods and spirits, known and unknown, the Gnorrl was

trying to make Rivv take a javelin! Why? Hok almost thrust himself into view, in his amazed eagerness to see more. Then it came to him.

The Gnorrls had puzzled it out. Man, fewer and weaker than they, had one priceless advantage, the javelin and the art of casting it. That was why Rivv had been seized and kept alive. The Gnorrls meant to learn javelin-throwing. Rivv was to teach them.

To Hok's distant ears came the voice of Rivv, loud even as it choked with rage: "No! No!" And the Gnorrls

He braced to meet the leap
of the screaming sabertooth



understood his manner, if not his words. Their own insistent snarls and roars beat like surf around the captive, and the Gnorrl who offered the javelin thrust it into Rivv's free hand and closed his fingers forcibly upon it.

Far away as he was, Hok could see the glitter of Rivv's wide, angry eye. For a moment the prisoner stood perfectly still, tense, in the midst of that clamoring, gesticulating ring of monsters. Then, swift as a flying bird, his javelin hand rose and darted. The Gnorrl who held Rivv's wrist crumpled with the javelin in his breast.

For one moment the other Gnorrls stood silent and aghast, their snarls frozen on their gross lips. In that moment a loud yell rang from on high. Hok sprang erect on the bluff, waving his javelin.

"Rivv!" he trumpeted. "Rivv, brother of Oloana! Run! Climb here!"

As if jerked into motion, Rivv ran. So, a breath later, did the entire squatting-place. Rivv dodged through his ring of captors and headed for the height.

"Climb!" yelled Hok again, at the top of his lungs. Rivv climbed.

He was active, but the rock was steep. He had barely mounted six times his own height when the first of the pursuing Gnorrls had reached the foot of the ascent. Stones and sticks of wood rained about Rivv, but by some unbelievable fortune none of them hit. He gained a great open crack in the face of the bluff, and swarmed up more swiftly. The Gnorrls were after him, scrambling like monkeys for all their bulk. But Hok, falling at full length above, reached down a great hand, caught Rivv's shoulder and dragged him up by sheer strength.

"Who are you?" panted Rivv, staring at his rescuer.

Instead of answering, Hok carefully

kicked a great mass of stone and gravel down upon the climbing Gnorrls. To the accompaniment of fearsome howls, both men turned and ran.

It was a splendid dash, on deer-swift feet given the further impetus of danger behind. Nor did it cease until, long after dark, Hok and Rivv came to the edge of the swamp and there made a fire. They talked long, and before they slept they touched hands, shyly but honestly, in friendship.

CHAPTER VIII

Alliance

THE midsummer dusk was thickening, and the half-moon of open space in front of Hok's cave was filled—with skin tents along the curve of rock, with cooking fires, and with men and women and children. Most of them were strangers, quiet but suspicious, dark of hair and sallow of skin in contrast to the tawny and ruddiness of Hok's brothers and sisters.

At a central blaze, small so that men might draw close, sat three grave figures. Hok, the host, was youngest and largest and most at ease. Opposite him, his long fingers smoothing his beard, was stationed Zorr, Oloana's father, who had last viewed Hok as his prisoner. The third man was the heavy, grizzled Nukl, head of the clan from which Kaga and Dwil had come.

"This meeting is a strange thing," said Zorr weightily. "It has never happened before that peoples who hate each other have met and eaten food and talked together."

"Yet it must be," rejoined Hok, very slow and definite in his defense of the new idea. "I sent your son, Rivv, back to you with the word to come. He and I are friends. He vouches for you. This is good hunting ground, as you yourself have seen."

"I think the meeting is good," chimed in Nukl. "Kaga and Dwil came from you to say that you were a true man, Hok. They said that there would be country and game enough for all of us."

"Why do you do this?" Zorr demanded. "It is not usual that a hunter gives away part of his good country for nothing."

"There are the Gnorrls to fight," said Hok.

Every ear within sound of his voice pricked up. Men, women and children paused at eating or chattering, to listen.

"I have told you about the Gnorrls, and of how Rivv and I saw that they intended to return and eat us up," went on Hok. "My people have killed many, but there are more Gnorrls than we have javelins. You, Zorr, bring four men with you, and Nukl has five, counting Kaga. My three brothers, whom I sent north to spy on the Gnorrls, and I myself make four. With the women and boys who can throw spears, we number three tens. That is enough to fight and beat the Gnorrls."

He felt less sure than he sounded, and perhaps Zorr guessed this. The southern chief pointed out that his own people came from the south, where Gnorrls were not a danger.

"But too many hunters live there," argued Nukl on Hok's side. "The game is scarce. You, Zorr, know that. Once or twice your young men and mine have fought over wounded deer."

"There will be no reason to fight for food here," added Hok. "Men need not kill each other. If anyone wants to fight, there will be Gnorrls."

"The Gnorrls never troubled us," reiterated Zorr.

"But if they come and eat my people up, will they stop here?" asked Hok. "They have learned that man's flesh is good, and they may come into your forests, looking for more."

Nukl sighed. "I think that I will have to stay. Zhik, the young man who is scouting up north, is going to take Dwil, the daughter of my brother Kaga. Kaga wants to stay, and I should help him if he is in danger." His eyes shone in the fire light. "Anyway, the Gnorrls have killed two of my people. I want some of their blood for that."

"That makes the southern forest less crowded," pointed out Zorr. "Plenty of room and game for my people."

But Hok had gained inspiration from what Nukl had said. "Zorr," he replied, "your son, Rivv, has asked for my sister, Eowi. She wants him to have her. I shall give her to him—if he remains with me."

Zorr stiffened, almost rose. He muttered something like a dismayed curse. Hok continued serenely:

"Two of your children will be here when the Gnorrls come. Also, if Oloana is spared, there may be a son, a child of your child—"

"I shall help you against the Gnorrls," interrupted Zorr, savage but honest in his capitulation. "When does the fighting begin?"

"When Zhik warns us," replied Hok gravely. "It may be many days yet."

AND the remainder of the summer went in peace. Hok and his new allies hunted successfully and ate well. Once a lone Gnorrl ventured close, to be speared and exhibited to the strangers as an example of what they must face sooner or later. The greatest item of preparation was the fashioning, by every person in the three parties of new javelins—sheafs and faggots of javelins, some with tips of flint, others armed with whittled and sharpened bone.

With the first chill of autumn, Zhik and his two younger brothers came loping into camp, dirty but sound. With

them they brought the news that Hok had long awaited with mixed attitudes of anxiety and determination.

The Gnorris were on the march. Up north in their country a blizzard had come, and it had nipped the brutal race into action. They were advancing slowly but steadily into their old haunts in the south.

"We are ready to meet them here," said Zorr at once, but Hok had another idea.

"No, not here. A day's march toward them is the best place."

Quickly he gave orders. Only the children remained at the camp before the cave. Barp and Unn were ordered to take charge there, but teased and begged until at the last moment Hok included them in the expeditionary force that numbered full thirty men, women and boys. In the morning they set out northward.

Hok, pausing at a certain damlike heap of stones, lifted his palm to signal a halt. Then he gazed as if for the first time at the rocky slope beyond the narrow level between it and the swift waters.

"We shall fight the Gnorris here," he said definitely, and almost added that he was sure of winning.

Zorr and Nukl moved forward from their own groups, coming up at Hok's elbows. They, too, studied the ground that Hok was choosing for battle. "How shall we fight them if there are so many?" Nukl asked.

Hok pointed at the slope. "That leads to the top of a bluff," he said. "The Gnorris will come from the north side, and will not climb, but will enter the pass between it and the river. They can come upon us only a few at a time, and we will have these rocks for a protection."

"How do you know that they will choose the pass?" was Zorr's question.

"They may go to the west, and through those trees."

Hok shook his head. "Before they come, we will set the trees afire—the sap is almost out of them. And the Gnorris will go east, into the pass."

Zorr and Nukl glanced at each other, and nodded. Then Zorr addressed Hok again: "It sounds like a good plan, better than any other. What shall we do?"

"Zhik says that there are more than ten tens of Gnorris. A few of us shall meet them on the plain beyond here, and make them angry. Then those few will run and draw them into the pass. After that, it will be as I say."

He gestured toward the crown of the slope. "You, Zorr, shall be the leader there, with most of the men, to throw javelins upon the Gnorris when they are close together and rushing into the narrow pass."

"But you?" prompted Zorr.

"I shall go, with my three brothers, to meet the Gnorris."

"Me, too," said Rivv, who had come forward and overheard part of the discussion. "I can run almost as fast as you."

"Very well," granted Hok over his shoulder. "You, too, Rivv. Now we must camp. First we will get ready, as far as possible. Are the women here with the extra javelins?"

"They are," Nukl answered him.

"Then I want some—as many as ten—laid midway between here and the far end of the pass." He turned around. "Oloana!" he called. "Bring the javelins that you have."

She came obediently, and they went together to lay the weapons at the point he had chosen. For a moment he studied them, then on inspiration picked them up and thrust their heads into the earth, the shafts pointing almost straight upward. "They will be easier to the hand," he commented.

"Why do you do that?" asked Oloana.

"You will find out," said her mate, rather darkly. Again he raised his voice. "Zhik, are you back there? You and Dwil take more javelins to the north end of the pass, and stick them there as I do here."

Zhik shouted comprehension of the order, and shortly afterward went trotting by with Dwil. When the two rows of spears had been set in place, all four young people returned to the barrier of stones. It was nearly evening. Hok, Zorr, and Nukl, as chiefs of their respective hands, kindled fires with appropriate ceremonies. Then there was cooking and discussion. Hok repeated his defense plan for all to hear.

"The women will stay back of these stones," he concluded, "except those who go, before battle, to set fire to the trees. I do not want anybody to run, unless the Gnorrls get the upper hand. Then those who are able must try to get back to the cave. The Gnorrls will have a hard time capturing that."

All nodded understanding, and both Zorr and Nukl spoke briefly to their own parties, in support of Hok's arrangement.

"When will the Gnorrls be here?" Hok then asked his brothers, for the benefit of all listeners.

"Tomorrow," replied Zhik. "Probably before the sun is high."

"Good," said Hok. "We must be awake by dawn, and take our places for the fight. Tonight we shall sleep, and be strong and fresh."

But as the camp settled to repose, he could not sleep. Neither Oloana nor Zhik could induce him to lie down. For hours after all had dozed away, he sat in the brisk chill of the night, on a large stone of the barrier. Now and then he weighed his axe in hand, or picked up a javelin and felt its shaft for possible

flaws. When he did close his eyes, he slept sitting up. Four or five times he started awake, trembling from dreams that the enemy was upon him.

CHAPTER IX

Conquest

THE Gnorrls were up betimes the next morning, stretching, grumbling, fighting for drinking room at the creekside. A light frost patched the ground, and necessitated building up of the fires that had burned low overnight. There was considerable bad feeling here and there, because some who had brought abundant food would not share with those who had little or none; but three or four of the largest and oldest sternly curbed all debate, even striking with clubs those who persisted. At length the advance began.

The formation was simple, but it must have been arranged and commanded by the wisest of those dark psyches the workings of which no human being can understand or even imagine. The fighting males of the horde went first, in a single line, close-drawn and several deep. In front walked the chiefs—perhaps their chieftainship was one of tradition or election, perhaps physical superiority, perhaps chance. All bore weapons—clubs, stones, or cleft sticks with pebbles in place for casting. Some carried the rough spears they had made in imitation of the javelins that had wrought such havoc among the Gnorrl-people.

Behind this wave of armed males came the females and the young, in a completely disorganized mass. Possibly they were held in that position as a supporting body in case of defeat, more probably they attended simply as curious watchers of the triumph that seemed already achieved. Sometimes the half-grown cubs of this rearward

body would scamper forward as if to join the fighting males, but they were always driven back with warning yells and sometimes with missiles.

That the Gnorris were able to communicate, to think ahead, and to obey their leaders can be demonstrated by the fact that they maintained their formation and their forward advance while the sun mounted higher and higher toward the top of the sky.

The morning was considerably beyond its halfway point when, pushing through a belt of scrubby willow that marked the dry bed of an old creek, the foremost of the Gnorris came out upon a plain with the river to the left and a bluff beyond.

First of all they saw a great cloud of murky vapor above the trees that grew to the right of the bluff—smoke. Tongues of flame flickered among the branches. The Gnorris faltered in their advance. Through that woods they had intended to go, and to kill men, their foes and persecutors on the rolling meadows beyond. Now they must go far to the west and so avoid the fire, or negotiate the narrow pass between bluff and river.

EVEN as their strange minds comprehended the new factor in the campaign, and before they could grapple with it for answer, a loud and mocking whoop sprang up from the quiet ground before them. A tall, tawny man in leopard skin rose into view from behind a bunch of dried thistles, so close to their ranks that several Gnorris marked and recognized his features—it was Hok, their foremost tormentor. A moment later an answering yell, from several throats at once, echoed from a point due east. Almost at the river bank four more young men popped up from a little hollow in the earth.

The Gnorris blared their own chal-

lenge, a fearful blast of rage and menace. Before it swelled, Hok had cast one, then the other of his javelins. The second was in the air before the first had struck down a leader of the Gnorris, and it flew beyond its fellow to pierce the heavy paunch of a warrior in the ranks. Then Hok yelled again, in derision and invitation, and began to run—not back toward the burning trees or the face of the bluff, but almost parallel with the front of the Gnorri array.

As he did so, his companions by the river threw their javelins, four in a volley and then four more. At that close range, barely forty paces, there was little chance of missing. Every javelin of the eight took effect, and four or perhaps five of the stricken Gnorris died on the spot or within moments. An earth-shaking bowl of execration went up from the army of brute-men, and the whole left wing of it charged full at the four audacious javelin casters, who turned, laughing, and fled. The right wing had crumpled upon itself to follow and overtake Hok, who still raced along the front of the line. A rain of ill-aimed missiles fell almost upon him, but the range, though short for a javelin in good hands, was too great for accuracy with stones or clubs. As the Gnorris lumbered with deadly intent upon him, came almost within reach, Hok swerved to his right and made for the pass.

For him, at least, it was a chase that taxed him to the utmost. Zhik, Rivv and the two younger lads ran easily away from their pursuers, but Hok, who had fled at an angle to draw the right-hand portion of the massed Gnorris after him, had a near thing of it. So close did the swiftest Gnorris win to him that they stretched out huge, eager hands in readiness to clutch him. But at that point he, too, turned into the straight line toward the pass and ran in earnest,

four flying strides to three of the best Gnorrl.

Zhik and Rivv had reached the point where the bluff rose, and a moment later Barp and Unn caught up. There, at the head of the narrow lane between rock and water, they came to an abrupt stop, and the Gnorrls as they ran heavily thought that these amazing adversaries were calmly plucking reeds or saplings that grew there in a clump. But the reeds were javelins, and Hok stooped as he ran, to let them hiss over his back. Two of his closest pursuers fell in mid-leap, somersaulting and writhing. That gave him a moment to run slower, whirl around, shout new insults and make again a gesture of invitation to the conflict. Three more of those nearest him collapsed before javelins thrown by the men at the head of the pass. Then Hok had joined his companions, and they were dashing along beyond the bluff.

That the Gnorrls were not cowardly was plain from their headlong and unfaltering charge against the shrewd javelin-volleys that had found more than a dozen targets; but they could be cautious as well. The moment the leaders reached the head of the pass, they stopped, as any sagacious wild thing should. Their instinct demanded that they investigate before plunging blindly in.

As they peered down the narrow strip of beach, on which the flying hacks of Hok and the others shrank and shrank with increasing distance, more Gnorrls caught up, paused and peered, too. Then the rest arrived, in a swarm that closed in upon itself, pushing, cramping, chattering, eager to know what went on ahead.

UPON that clot of life, that gathered while the leaders studied the situation during a dozen breaths' spaces, fell destruction. From the crown of the

bluff overhead came javelins and more javelins, and the yells of triumphant marksmen who take pride in seeing their casts fly home. Zorr, Nukl and nine others were hurling shafts as swiftly as they could seize them from the great scattered store at their feet.

The fire took effect in the midst of the packed throng, and for a moment or so the Gnorrls in that central position were all that experienced and comprehended what was happening. They did considerable screaming and milling before the outer edge of the pack, which could move in defense and retaliation, understood and peeled away and dashed with a fine show of courage at the foot of the bluff.

The Gnorrls could climb, even where human hands and feet might fail at the steep ascent; but it was foolish and vain to advance against the defenders above. Laughing hoisterously in their security, Zorr's and Nukl's men centered their attention upon this scaling party. Not a javelin went wrong, and only one Gnorrl reached the brink of the level space above. Him they allowed to mount up and up, after the others had been picked off or had retreated. Mouthing his inarticulate war-cry, he scrambled pluckily up among them; and every man of the eleven stabbed home in his hairy body.

In the meantime, Hok and his four companions had come to a halt once again, midway down the pass. Their saucy yells and capers stung the pursuers into motion as before. There was a great struggle to rush down the narrow way, so much of an effort to be first that half a dozen or more of the Gnorrls were thrust by their fellows into the rapid water, where they were whipped howling away and under, helpless to fight to shore. Meanwhile, the fugitives waited only until the rush was well under way before snatching more jave-

lins from where they seemingly sprouted and sending them singing into the face of the attack. So narrow was the front, so close together the Gnorrls, that half a dozen casts raised a veritable heap of bodies, damming for a moment the onset of the others. And yet again the decoy party, not one of whom had suffered so much as a scratch, turned and fled, distancing all pursuit.

The Gnorrls stubbornly followed, while javelins from in front and from the height above claimed lives and lives. A new blizzard of flint points seemed to pour from a heaped barrier of rocks. To this they charged panting, and now their enemies did not run. They thrust and hacked from behind their defense, and more poured down from the slope, striking from the flank. Women at the rear screamed encouragement and threw javelins. When the supply was gone, they threw firebrands and rocks.

One who fights thus hand to hand remembers little about it afterward, nor cares to. He is only glad when it is over. It does not make much difference even to realize that he has won.

HOK would not hold his head still as Oloana tried to lay a broad green leaf upon the gash that showed the bare white bone of his chin-point.

"How many are killed?" he asked once more.

"Zorr, my father, is only stunned," she replied. "For a time we thought that Rivv would be our chief."

"I am your chief," Hok reminded her. "Nukl is dead?"

"Yes, and Kaga. Perhaps Zhik will lead that party after this."

"I think that Zhik will limp always," Hok's voice was low, but Zhik, sprawling nearby, overheard.

"I shall not limp always," he shouted defiantly. Then he shut his mouth and gritted his teeth as Dwil dragged

strongly upon his ankle. She, too, turned a protesting face toward Hok.

"The leg bone is broken," she conceded, "but I will put sticks on each side, and hold the break shut with clay. My people know how to cure lameness of this sort. He will walk before winter is over."

"Kaga is dead," said Oloana again, "and I think three more of those who were on the high ground. They charged and killed many Gnorrls, but the Gnorrls were able to get at them. They had no harrier of stones." She smoothed down the leaf. Hok's blood was thickening under it and would hold it in place.

Barp, spitting blood from broken teeth, was returning from a survey of the pass.

"How many are dead?" asked Hok.

"I do not know. Very many. Far north I could hear the others crying, like rabbits in the snare."

"I am glad that some were left alive," said Hok suddenly. "They will always be afraid to come back here, and will tell other Gnorrls, and the young ones who are born after them, of how terrible we are."

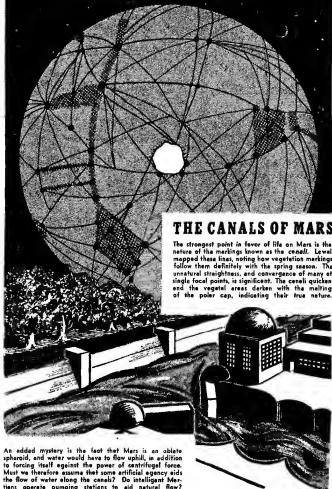
Barp did not share this approval of the situation. "I want to fight Gnorrls again some time," he said, rather wistfully.

Hok put out his hand to cuff affectionately the lad's untidy head. "Wait," he counseled. "You have many years. There is enough game country for all of us who are left alive, but more men will come. When this country is crowded, you and others can go north and capture new ground from the Gnorrls."

"And when the Gnorrls are all killed?"

"That will take a very long time," said Hok, "but when the Gnorrls are all killed, men will own everything."

RIDDLES OF SCIENCE



THE CANALS OF MARS

The strongest point in favor of life on Mars is the nature of the markings known as the canals. Lowell mapped these lines, noting how vegetation markings follow them definitely with the spring season. The unnatural straightness, and convergence of many of single focal points, is significant. The canals quicken and the vegetal areas darken with the melting of the polar cap, indicating their true nature.

An added mystery is the fact that Mars is an oblate spheroid, and water would have to flow uphill, in addition to forcing itself against the power of centrifugal force. Must we therefore assume that some artificial agency aids the flow of water along the canals? Do intelligent Martians operate pumping stations to aid natural flow?

THE TREASURE ON

By
**FREDERIC
ARNOLD
KUMMER Jr.**

CHAPTER I
Captain of the Stella

MARTIN CHANCE glanced curiously up at the big chrome and crystalloid mansion, then, shrugging, knocked on the door. A little Martian butler opened it, made questioning noises.

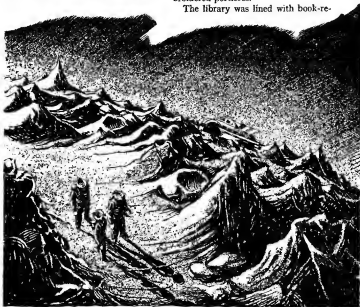
"Captain Chance," Martin announced. "Mr. Bronson expects me."

"Yes," the butler squeaked, "Mr. Bronson is in the library."

Chance followed the wave of the butler's hand, brushed aside thick, embroidered portieres.

The library was lined with book-re-

Somewhere on the bleak asteroid was concealed a great fortune in radium, and Captain Martin Chance had to match science with science to thwart Telak Thorn, most feared Venusian



ASTEROID X



Miles of the asteroid's black surface were visible as he shot up into the void

cordings, dim in the light of a single lamp. Entrenched behind a massive steel desk was a grey-haired, jut-jawed man whom Chance had little difficulty in recognizing as Stephen Bronson, multi-millionaire head of Interplanetary Exporters, Inc.

Beside him, her vivid coloring emphasized by a blue cellosilk gown, sat a girl . . . a girl whom Chance, had he followed the society television broadcasts, might have recognized as Stella Bronson, style-setter, aviatrix, and boyden of the Martian colony's social set.

"Captain Chance?" Bronson laid aside his half-smoked cigar, arose. "My

daughter Stella. Sit down. Smoke?"

"Glad to know you, Miss Bronson." Martin Chance lit a cigarette, sank back into an overstuffed chair.

"Chance," Mr. Bronson began ponderously, "you've been recommended to me as an able skipper and a man who'll keep his mouth shut. Donovan, captain of my yacht, the *Stella*, died yesterday. You'll replace him. Salary, two hundred dollars a month."

"Very good," Chance replied, wondering. "I'm sure I . . ."

"Wait'll you hear the whole story." Bronson shook his grizzled head. "Know how Donovan died?"

"Can't say I do," Chance murmured. "Haven't heard the newscast."

"He was murdered!" Bronson's fist crashed down on the desk, violently. "Rayed on Ki Street in broad daylight! And I'll tell you why. The persons who killed him thought he might have information in his possession as to the destination of the *Stella*!"

"You're planning a cruise, then?" Chance asked. "I'm afraid I don't follow . . ."

"Dad gets everyone confused," Stella Bronson laughed. "One of the prerogatives of being a tycoon. Proceed, Guv'nor!"

"Captain Chance," Bronson said solemnly, "did you ever hear of Edward Garth?"

"Garth?" Martin repeated. "You mean the old space pirate?"

"Exactly. About a hundred years ago when interplanetary travel was in its early, lawless stage, this man Garth became the scourge of the spaceways. Captured over thirty ships and amassed a fortune estimated at half a ton of radium before a patrol fleet took his ship. The radium, however, was not found on board . . . only a score of corpses, Garth among them, who were strangled when the patrol ships blew a hole in the side of the ship. Today there is hardly a planet which doesn't have some legend of Garth's treasure being buried there. So much for history. As for how I got mixed up in this business . . ."

"About a month ago I was down by the space port to supervise the unloading of a valuable cargo from one of my vessels. On the way home I was driving through the slums in my canal-car, saw what appeared to be a fight on the embankment. Two big Venusians were raying at an earthman crouched in a doorway. Taking my heat-gun from a pocket of the car, I leaped to the bank,

shooting. One of the Venusians toppled into the canal and the other took to his heels. The old earthman, however, was done for. There was a hole as big as your fist burned through his lungs. He had just time to gasp a few words before he died. 'Map,' he muttered. 'Garth's treasure. They didn't get it. I give it to . . . you!' And he handed me . . . this!"

From his breast pocket Bronson took a yellowed, thumbled bit of paper, handed it to Chance. The spaceman unfolded it, examined the rows of figures, of equations. Astronomical calculations, he noticed, in the clumsy, old-fashioned sidereal lineations system. Considerable desk work would be necessary before the exact location of the treasure could be computed.

"Somewhere near the asteroids, roughly, isn't it?" he said, handing the map back to Bronson. "Bury treasure on one of those barren little rocks and nobody'd ever find it. If the directions are authentic."

"I'm inclined to believe they are." Bronson stroked his belligerent jaw. "Certain peculiar things have occurred since the map has been in my possession. The murder of Donovan, for instance. And treasure or no treasure it'll make a fine cruise."

"Very good," Chance nodded. "When do we take off? . . ."

He halted abruptly, staring at Stella. The girl's face was white, her eyes fixed on the heavy drapes at the door of the library. Chance, following her gaze, saw the portieres sway slightly; beneath them projected the tip of a black leather boot.

MARTIN CHANCE stood up, his bronzed face harsh. Crouching slightly, he dove toward the entrance, arms outstretched. Behind the thick velvet of the curtain he felt a lithe,

squirming form struggling desperately to break away. Chance grinned, tightened his grip.

Suddenly, with a ripping sound, the curtain tore loose, enveloped the spaceman in its heavy black folds. Blinded, half-suffocated, he felt the unknown twist free. Bronson's voice was shouting furiously and the fierce hiss of a ray gun was audible. Chance threw off the enveloping curtain, straightened up.

In the open doorway of the house stood Bronson, his heat gun cutting red swaths in the darkness of the street outside. On the floor of the hall lay the little Martian butler, unconscious, with Stella kneeling beside him. Far down the street Chance could see a shadowy figure running swiftly, fading into the murky gloom.

"No hope of catching him." Bronson shook his head, stepped inside. "You're all right, Captain?"

"Quite." Chance stared ruefully at the fallen curtain. "Sorry I couldn't hold him. How's the butler, Miss Bronson?"

"He'll be okay," Stella smiled. "Stunned by a blow on the jaw, that's all. Do you believe now, Captain Chance, that those fellows mean business?"

"Convinced of it!" Chance smoothed his rumpled hair. "Is the map safe?"

"Yes," Bronson nodded, his eyes slivers of grey granite. "But we'd be foolish to delay here any longer than necessary. Mars is getting dangerous! We'll take off at dawn!"

CHAPTER II

In Search of Treasure

THE *Stella*, a sleek silver hullet, hurtled through the black void, her rockets flaring like a comet's tail behind. In the small but completely

equipped control room Martin Chance stood stiffly erect, his eyes fixed on the banks of gauges, dials and indicators. Like a tall automaton he steered, touching the T-bar lightly for an occasional blast of the directional rockets.

The speedy little yacht had proven, during the past three weeks, a delight to handle; the ship's officers, her crew, seemed efficient; and the growing friendliness of Stella Bronson was something which few men in the Solar System would not have envied.

Yet in spite of all this, Martin Chance was uneasy. There was something about the vessel that worried him. The mysterious figure that Davis, the chief engineer, had seen lurking about the main hold, for instance. And the soft footsteps that Stella claimed to have heard in the hallway outside her cabin. Little things, apparently of no importance, and yet . . .

Chance glanced at the glassex viewplate before him. The asteroids were spilled across the sky ahead like pearls from a broken necklace. Among them, distinguishable by its greenish hue, was the one they sought, tentatively listed as "Asteroid X." In another hour they'd be coming in to land . . .

The door of the control room creaked noisily. Chance spun about to find Bronson, nattily clad in a grey yachting costume, standing on the threshold.

"What's the matter?" the financier chuckled. "Nervous?"

"No," Chance said stiffly. "Just cautious. Frankly, Mr. Bronson, I don't like things that've been going on lately. Cook tells me someone's been stealing food from the supply rooms. And that figure Davis saw . . ."

"Nonsense!" Bronson waved a contemptuous hand. "You spacehands are a regular bunch of old women! We ditched that gang who were after the map when we left Mars. Who'd want

to steal it anyhow, with us heading for the asteroid?"

"Might want to find out whereabouts on the asteroid the treasure is buried." Chance thrust his jaw forward grimly. "And I'm just enough of an 'old woman' to order a search of the ship! Right now!" Connecting the T-bar to the robot pilot, he hustled past Bronson, strode from the control room.

Chance frowned angrily as he stalked along the corridor. So Bronson thought he was an 'old woman,' did he! It would have been an easy matter for someone to hoard the yacht while she lay in the Martian space-port, conceal himself in one of the holds. And that someone . . .

A stifled, desperate scream echoed dimly along the corridor. A woman's scream! Stella! In danger! Chance, his lean face tense, raced toward the luxurious suite shared by Mr. Bronson and his daughter. Feet pounding on the metal flooring, he plunged forward. Another scream, fainter, muffled. Gasping, Chance threw himself against the heavy aluminum door. Unlocked, it swung wide.

The small sitting room that lay between Bronson's and his daughter's bedrooms presented a shocking scene. Lying upon the divan, her sheer tyla gown torn and disheveled, was Stella, bound hand and foot, partially gagged by a knotted towel. That she had struggled was evident from the overturned chairs, the litter of hric-a-hrac swept from the table. At the other end of the room, his back to the doorway, stood a tall, powerful figure. Bent over Mr. Bronson's desk, the man was attempting to force one of the drawers with an iron bar.

As Chance hurt into the room, the intruder whirled about; his face, shadowed by a low-visor Venusian cap, was indistinguishable.

Chance plunged across the room, both knotted fists flailing. The other man backed away, blood streaming from his nose, his iron bar raised. Again the *Stella's* captain charged forward, sinking his right with all the force of his wiry frame into the intruder's stomach. With a grunt the unknown retreated. Grinning, Chance sprang once more to the attack . . . and as he did so, the iron bar descended. A million fireflies danced before Chance's eyes. Dimly he heard Stella crying for help and then the floor banged against his chin.

STELLA'S voice, the last thing Chance had heard before lapsing into unconsciousness, was the first sound he heard on regaining his senses.

"Captain Chance!" she was saying. "Martin!"

Somewhat groggily he sat up. Stella knelt beside him. In the doorway stood Bronson, Davis, the chief engineer, and Houck, grizzled, weather-beaten first mate of the yacht.

"Ah!" Houck bent down, helped Chance to his feet. "Easy does it, sir. The map's safe, so Miss Bronson says. Fellow who hit you didn't stop to go through the desk. Any idea who he was?"

"No." Chance shook his head. "But I'll soon find out. Whoever it was, he's got one bloody and swollen nose! Mr. Houck, assemble the crew in the mess hall!"

Stella, a light cloak thrown over her torn dress, followed Davis, Chance, and her father to the small mess hall on the deck below. The crew, some ten hrawny spacehands, were lined up against the wall under Houck's vigilant eye.

"Here they are, sir," he said, turning. "But I don't think your man is here."

Chance studied the faces of the men. Burly Jovian oilers, tall Bronson deck

hands, the fat Martian cook. None bore evidence of having been in a fight, though their expressions seemed surly, defiant.

"Just as I thought!" Martin Chance's eyes were blue ice. "There is someone else aboard. Someone who. . ."

The voice of Vettner, the second officer, came crisply over the interior communications system.

"Captain Chance! We're within braking distance of Asteroid X! Any further instructions before I land?"

Chance wheeled, faced the crew.

"Back to your stations!" he snapped. "Lively now! Houck, you and Davis come with us to the control room!"

The asteroid, viewed through the observation port of the control room, was forbidding. Barren, desolate, a mere cinder of black meteoric stone, it seemed a weird shadowy inferno in the red glare of the yacht's forward rockets.

"Just the sort of place a space-pirate would pick to bury his loot," Chance muttered. "Less juice, there, Vettner. No gravity to speak of. That's right. Okay."

Riding its columns of fire the ship settled down on the asteroid's bleak surface, grounded with a slight hump.

"And now" . . . Martin Chance faced the group in the control room . . . "we've got some decisions to make. Fast! Mr. Bronson, what do you want to do about this mysterious stowaway?"

"Do?" Bronson leaned forward, his face stony. "Why, have the crew search the ship, capture him! What can one man . . ."

"One man!" Chance laughed, harshly. "Mr. Bronson, it's practically impossible for this stowaway to have remained on board three weeks without one or more of the crew knowing about it! On a liner he might get away with

it, but on a vessel this size. . . . Hardly likely."

"You mean," Stella whispered, her face white, "that the crew are working with him, planning to . . . to mutiny?"

"I don't know." Chance stared moodily at the rocky surface of the asteroid outside. "Half a ton of radium'll corrupt the most honest of men, let alone a crew of hard-bitten space rats. Best thing for us to do is sit tight until morning. We're six and they're ten, not counting the stowaway. A search for him now might bring matters to a head. Tomorrow I'll send half a dozen of the crew out in space-suits on some fool's errand and then, with the odds equal, we'll find this stowaway, put him in irons."

"Best plan, sir," Vettner murmured. Davis and Houck nodded in agreement. Mr. Bronson, still somewhat scornful, shrugged carelessly.

"Shying at shadows," he muttered. "I'm going to turn in. Coming, Stella?"

The girl followed her father to the door, paused on the threshold.

"I . . . I haven't thanked you, Captain Chance," she murmured. "That terrible man in my room . . ."

"Just forget it," Chance smiled reassuringly. "You'll be safe tonight. We'll stand watch in the corridor. Armed. Houck, you'll take the first two hours, Davis the second, I'll take the third, and Vettner the fourth. Goodnight, Miss Bronson!"

CHAPTER III

An Atom of Oxygen

MARTIN CHANCE, a heavy heat gun strapped at his belt, stepped into the passageway to relieve Davis for the third watch.

"Thought you'd never come," the engineer grinned. "I'm sleepy as a hat."

"Am myself," Chance admitted,

yawning. "Suppose I'll wake up after I've been out here a few minutes, though. S'long, Davis."

Left alone in the corridor, Chance paced slowly up and down, his mind a tangle of thoughts. The strange occurrences of the past twelve hours preyed upon his nerves. The mysterious stowaway, and the surly attitude of the crew when he assembled them in the mess hall. . . . What were the intruder's plans for gaining control of the ship? Open mutiny, or something more subtle, more insidious? Thoughts of the treasure, great lead chests of radium, flashed through his mind. Garth, the picturesque red-bearded old pirate, attacking ships, forcing his captives to walk through the air-locks into the void, amassing a fortune in radium. Was this blood-bought booty to reach through the years, claim new victims?

Chance shook his head, fighting against an overwhelming desire to sleep. Awake . . . he'd have to stay awake. To see that no harm came to Stella. Memory of the girl's sleek dark hair, her vivid scarlet lips, her slender, delicately-formed figure, rose before Chance's eyes. For Stella. . . . The captain caught himself nodding, straightened up abruptly. His arms seemed suddenly leaden, the slightest movement an effort.

Chance glanced about the long, dimly-lit corridor, panicky. Something . . . something unknown . . . was dulling his senses, forcing him into unwilling slumber. A strange force that he could not comprehend, could not combat. Deliberately he took a deep breath, hoping to recognize the odor of some drug, some gas. No such odor, however, was distinguishable. Chance dug his nails deeply into his palm, struggling against the terrible temptation to throw himself on the floor, to sleep.

A gas that had no smell, yet brought

on unconsciousness. Chance frowned, spurring his dulled mind through sheer effort of will. A gas . . . Carbon monoxide! Of course! But no stowaway could have brought enough carbon monoxide aboard to permeate the entire ship. Chance tried to piece together this puzzle, his eyelids drooping. If carbon monoxide were being released in the ship, why did not the air-conditioning unit cleanse it, just as it took the used air, carbon dioxide, and broke it down, releasing pure oxygen to be breathed once more?

The air-conditioner! That was it! A few simple adjustments by a clever chemist and the machine would only partially break down the carbon dioxide. Remove only one atom of oxygen and thus create the deadly CO!* And the stowaway, his followers, wearing space-suits taken from the emergency life-lockers, would be immune!

Reeling, staggering drunkenly, Chance set out in the direction of the air-conditioning unit located well aft in the rear of the ship. A cruel hand seemed to be squeezing his heart, heavy weights pulling his eyelids closed. Paralyzing numbness crept along his arms; blood thundered in his ears. Fighting against unconsciousness, he stumbled on. Down the companionway, along the catwalk that ran above the engine room. Instinct alone kept Chance's feet on the narrow runway. Now he was approaching the door that led to the small compartment housing the air-conditioner. Gasping, he pushed it open, stepped inside.

A bulky, space-suited figure stood on

* Carbon dioxide is formed when carbon or matter containing carbon is burned: $C + O_2 = CO_2$. Carbon Monoxide is formed when carbon burns in a limited supply of oxygen, or by passing CO_2 over hot charcoal or coke: $CO_2 + C = 2CO$. In the air-conditioner, it is quite possible, by substituting a vacuum tube incorporating a carbon element, to change the ordinary CO_2 exhaled by the lungs to the deadly CO .—Ed.

guard within the tiny compartment. One of the rocket tenders, a burly Jovian, his flat brutish face emotionless behind the glassed front of his helmet! As Chance burst into the room, the Jovian's hand flashed to his hip. Fingers clumsy in their thick asbestoid covering, however, he was slow to draw. The *Stella's* captain, swaying weakly, tilted his holster, fired from the hip. A vicious red ray stabbed through the gloom, struck the front of the Jovian's helmet. Limply, the big man toppled to the ground.

Chance dropped his gun, lurched toward the maze of machinery that made up the air-conditioning unit. Two wires to be transposed, a substituted tube to be replaced. He worked furiously, struggling against the black mist that veiled his eyes. Five minutes' frenzied labor and the machine was back at its old task of filling the ship with pure life-giving oxygen. Chance nodded vaguely, smiled. Now to reach the others, revive them. Sleepy . . . he was so sleepy. Perhaps just a moment's rest. Just . . . a . . . moment's . . . rest. . . .

MARTIN CHANCE awoke to find himself lying on the floor of his own cabin. Beside him, securely bound, were Houck, Bronson, Davis, and Stella. With an effort Chance struggled into a sitting position.

"Awake, eh?" Bronson muttered. "How d'you feel?"

"As well as can be expected, I guess." Chance glanced about. "Where's Vettner?"

"Too much carbon monoxide. His heart went bad." Bronson shook his head. "Stella and the other two are still half-asleep. You were right, Chance, about the crew mutinying. How we'll ever get out of this mess, I don't know!"

Before Chance could reply, footsteps sounded in the corridor outside. A key turned in the lock and the door swung open. In the entrance stood a tall, scarred man, a Venusian to judge from the golden *thorth*-bands that adorned his wrist. Behind him were grouped several members of the crew, heavily armed.

"So" . . . the Venusian's sallow features broke into a sardonic smile . . . "you slept well, yes?"

"What's the meaning of this?" Bronson thrust forward a truculent jaw. "You . . . By God, Chance! This is the fellow who escaped us on Mars!"

"True," the stowaway smirked. "We are old friends, Mr. Bronson. We met once the night you got Garth's map and again in your library. Luck has been with me. I had only to smuggle myself aboard this yacht, promise your men a fair share of the treasure. Now I have a space-ship, a crew, and before many hours have passed, will be in possession of an incalculable fortune!" He drew the map from his pocket, waved it derisively before Bronson's eyes.

The financier, inarticulate with rage, gritted his teeth. Old Houck, his face grey from the effects of the carbon monoxide, raised himself to one elbow.

"What about us?" he demanded. "What do you intend to do?"

The Venusian laughed, revealing teeth stained blue by the habitual use of Jovian tobacco.

"My name," he said, "is Telak Thorn. Need I say more?"

Davis, the engineer, swore softly. Stella, now fully awake, shuddered. Telak Thorn was a name well known to the Solar System. Murderer, outlaw, dope-runner . . . leader of the bloody Venusian insurrection, known on Mars as "The Butcher." Interplanetary enemy number one . . . cruel, sadistic, merciless.

"You understand?" Thorn chuckled. "I have decided, in deference to the memory of old Garth, to execute you by his favorite method. I will enjoy watching you good people walk through the air-lock. There may, however," . . . his reddish, beady eyes flicked toward Stella . . . "be exceptions."

Chance, his face pale, staggered upright, straining at his bonds.

"You scum of the cosmos!" he whispered. "I . . . I . . ."

Thorn's fist shot out, sent the helpless earthman to the floor.

"Come," the Venusian said harshly. "We've wasted enough time on these fools! Let us go!"

Turning, he strode from the cabin. The heavy aluminum door slammed shut, its lock clicked.

"God!" Mr. Bronson bowed his head, suddenly old, weary. "Prisoners in the hands of that fiend! And as soon as he gets back with the treasure . . ."

"We've a few hours, anyhow," Davis muttered. "Maybe if we could get free of these ropes . . ."

"That's easy enough," Houck chuckled. "We learned all such tricks during the Lunar uprisings. Anybody here smoke?"

"I do," Bronson said. "I'm old-fashioned."

"Got matches, then?"

"No. A lighter."

"Just as good." Houck backed up to Mr. Bronson, took the little cylinder from his pocket. "Now, Captain, this'll hurt a bit. . . ."

"All right," Chance said impatiently. "Go ahead."

Houck twisted the base of the cylinder and a tiny flame shot out of the lighter. Sweat poured out on Chance's forehead as the little flame seared his wrists but he did not move. All at once the charred rope gave way.

"Ah!" Chance stretched his cramped

arms. "Give me the lighter. I'll loose the rest of you."

Five minutes later the others were free. Stella, glancing through the port-hole, froze into sudden immobility.

"Look!" she whispered.

EIGHT figures, space-suited, laden down with atomic drills and suction shovels, were crossing the barren plain. Gliding cautiously, since a quick movement might have been disastrous in the asteroid's feeble gravity, they cast long, black shadows on the rocky surface.

"Eight," Chance nodded. "There were eleven, counting Thorn. And I rayed one last night. That leaves only two to guard the ship. If we could break down the door . . ."

"Impossible." Houck tried the lock. "Aluminum an inch thick. And if we hammer on it, the guards'll bear us. Looks like we're done for." He shook his head dismally.

Chance studied the cabin. It contained a bunk, a clothes press, a chair, a wash stand . . . nothing that would help in the forcing of doors. There were instruments, also, as was customary in the captain's quarters . . . a speed indicator, a sidereal compass, a big mercury barometer for showing the air pressure within the ship, since a drop in pressure might indicate a leak in the hull. Chance stood still, his eyes on the barometer. Mercury . . . and water available in the tap on the wash stand. . . .

"I've got it!" He whirled about, snatched the barometer from the wall. "Houck, fill that tumbler with water! Here, Davis, help me break this barometer!"

The others, watching, saw Chance snap off the end of the instrument, drip mercury through the keyhole into the lock.

"Now!" he snapped. "The water!"

Houck handed him the tumbler and Chance poured a stream of water into the lock.

"See here," Bronson began. "Just what . . ."

"The mercury removes the oxide film on the aluminum," Chance said patiently, refilling the tumbler. "In contact with water the metal shows its true nature and reacts rapidly, giving off hydrogen." He pointed to the bubbling water. "As a result the aluminum breaks down into aluminum hydroxide, a white powder. Watch!"

Eyes fixed on the lock, they waited. Long minutes passed. Again and again Chance refilled the tumbler. Slowly the entire lock began to erode, leaving only a white dust.

"Now!" Chance reached down, turned the knob. The lock grated, rattled brokenly, and the door swung open.

"Free!" Bronson cried. "Thank God!"

His voice, shrill with excitement, echoed along the corridor. Chance gripped his arm, motioned for silence, but it was too late. Heavy footsteps rang on the metal floor and two of the deckhands burst into the passageway, heat guns blazing in an inferno of crimson flame.

Davis, who stood beside Chance, slumped to the floor, his leg badly seared. Whirling, the foremost mutineer levelled his gun at the captain. Quite instinctively Chance drew back his arm, let fly the water tumbler, dropping to his knees as he threw.

A blood-red beam passed within a foot of Chance's head, scorching his hair. An instant later the glass crashed into the face of the mutineer, cutting it into a gory mask. Blinded, he lurched against his companion just as the latter was drawing a bead on old Houck. Before he could fire again both Chance

and the grizzled, leathery Bronson upon him, pinning him to the . . . and

"Tie them up!" Chance had seized "Davis, how's your leg?" a shield,

"Not so bad." The engineer forced a smile. "Can't walk, though."

"All right. You stay here and guard the ship." Chance picked up the injured man, placed him on the bunk in the cabin. "We're going to get that radium!" He turned, opened the life-locker, took out three space-suits, three heat guns.

"Wait a minute!" Stella faced him, her blue eyes blazing. "How about me? I can handle a gun and if you think . . ."

"But Miss Bronson," Houck protested. "It's dangerous . . ."

"If it wasn't, she wouldn't want to come," Bronson grunted. "She's been chasing trouble for nineteen years."

"As you wish." Chance shrugged, handed Stella a space-suit. "So long, Davis." Shaking hands with the injured engineer, he moved toward the air-lock.

CHAPTER IV

The Cairn

THE surface of the asteroid was rough, rocky. The black, basalt-like stone, pitted and scarred by meteors, cracked by the bitter cold, would have made for hard going had it not been for the weak gravitational pull that enabled the four terrestrials to leap yawning crevasses, jagged peaks. After half an hour's walking Chance gazed about at the barren, desolate terrain, motioned to the others to halt.

"Near as I can remember, the cache was supposed to be somewhere around here," he said. "But without the map it's hard to say. Might be anywhere within ten miles."

"You unturned, studying the incredible horizon of the little world. I have memory could see any distance at all," his favored. "It's like eternally coming up over the brow of a hill."

"Why not jump?" Stella chuckled.

"Go up and take a look around."

"By all space!" Chance cried.

"You've got it! Here goes!"

Crouching low, he jumped straight up with all the power of his lean, hard frame. A moment later he was soaring aloft, shooting upward through the airless void. Below him the others seemed tiny dolls; miles of the asteroid's bleak surface were visible on all sides.

Chance was at the peak of his rise when he saw it, a rocky cairn built of basalt slabs piled together in the form of a rude pyramid. Just a glimpse of it, he had, before he began to descend and the cairn was lost from view.

As Chance came lightly to earth, the others rushed toward him.

"Okay, sir?" Houck asked. "See anything?"

"All right." The captain struggled to his feet. "And there's a cairn over that way. Come on!"

With long leaping strides they made their way toward the pyramid. Chance, his face drawn behind the glassex front of his helmet, fought down a thousand worries. Four against eight! And Stella . . . he should not have permitted her to come on such a dangerous mission. . . .

"Captain!" Houck's voice sounded in his earphones. "The cairn!"

Chance looked up. Ahead was the pyramid, a rocky finger thrusting at the sky. At one side of it several slabs of stone had been removed to reveal a dark, narrow opening.

"Quiet!" Chance whispered, stepping into the opening. Silently the others followed him, groping blindly in the darkness. Rough stone steps circled

downward; like huge misshapen monsters in their hulky space-suits, the four terrestrials descended endlessly, into the depths of the cavern. After long minutes of descent, the steps ended abruptly in a rough-hewn corridor.

Chance, leading the little party, proceeded cautiously, his eyes trying to pierce the stygian gloom for possible traps or pitfalls. Through the microwave set he could hear Houck's heavy breathing, Bronson's muttered exclamations, Stella's barely audible humming. Other sounds came to his ears, too, a vague confused habble of voices. Thorn and his followers, somewhere in the maze of galleries, speaking through their communications sets. Using the voices as a guide, Chance picked his way through the sable shadows.

All at once lights gleamed ahead. Feeble, far-off lights. Chance quickened his pace, moving in silence toward the faint glow. Behind him came Stella, her eyes bright with excitement, Houck and Bronson, gripping their heat guns.

Abruptly the corridor turned left. Rounding the corner, Chance stood for a moment frozen by the scene that lay before them. At the end of the passage was a cavern, high-roofed, blasted from the black, living rock. The unwavering, greenish glare of a *radite* lantern drew black grotesque shadows from the corners of the cave, set them dancing on the ceiling.

Standing before the lamp was Thorn, a gun in each hand, his face vulture-like behind the glassex front of his helmet. A heap of rubble, loose stone, lay on the floor of the cavern and waist-deep in the excavation stood two brawny figures, laboriously lifting a great leaden chest. At sight of the chest old Houck drew a sharp breath.

"Look!" he whispered. "A radium container! Garth's treasure!"

As he spoke, Thorn whirled about, his sallow features contorted with rage. Twin red beams flickered through the gloom, passing over the heads of Bronson and Houck who had thrown themselves flat on the ground. Chance and Stella, stepping behind a projecting shoulder of rock, were shielded from the heat blasts.

Four guns, in answer to Thorn's attack, spat vicious crimson flame. Three of the mutineers slumped to earth and the remainder, groping for their guns, retreated, disorganized. Thorn, crouching behind the heap of rubble, swept his weapons in searing arcs, turning the cavern into a hell of ruddy rays. The greenish *radite* lantern, the lurid red fury of the heat guns, the shambling, ungainly space-suited figures, the monstrous, fantastic shadows . . . a madman's dream, Chance thought, wriggling his way forward.

Still there was no fight from the other mutineers. Taken by surprise, disheartened by the loss of three of their companions, they seemed wavering between allegiance to Bronson and greed for the radium. Sensing their indecision, Chance sprang to his feet.

"Men!" he shouted. "Surrender and there'll be no charge of mutiny when we return to Mars! You'll get a share of the treasure and . . ."

He broke off, ducking, as Thorn fired. The stabbing ray caught the muzzle of his own gun, heating it, in merely a second's contact, until he was forced to drop the weapon. An answering volley by Houck and Bronson drove the outlaw to cover once more.

"Now!" Chance cried. "This way, Houck! We'll close in behind him!"

Houck and Bronson, keeping a wary eye on the irresolute mutineers, crept forward. All at once Thorn sprang from his hiding place, leaped past them

with incredible swiftness. Bronson whirled about, raised his gun . . . and then lowered it. Thorn had seized Stella, and, using the girl as a shield, was backing along the corridor.

"Stay back!" he shouted hoarsely. "Shoot, and the girl dies first!"

Chance gazed at Stella, helpless in Thorn's iron grip, her feet dragging on the rocky floor of the cavern. Suddenly an idea flashed through his brain.

"Stella!" he shouted. "Jump! Jump!"

A quick look of understanding crossed the girl's face. Flexing her knees slightly, she leaped straight up. Thorn, taken by surprise, was carried with her, shooting swiftly aloft in the light gravity. Wildly he threw up his hand to prevent his glassed helmet from being smashed on the corridor's rocky ceiling. Taking advantage of the outlaw's confusion, Chance hurtled upward toward him. For one mad moment the three of them struggled in midair, then crashed to the floor of the passageway, Thorn undermost.

"Ah!" Chance picked himself up, glanced at his adversary's limp unconscious figure. "Knocked the breath out of him! You all right, Stella?"

"R-right," the girl gasped, watching old Houck take a length of wire from his pocket, lash Thorn's arms and legs. Her father, gun in hand was covering the four mutineers.

"Chance!" Bronson shouted. "Look! Six chests of radium, packed full! A . . . a fortune! For all of us!"

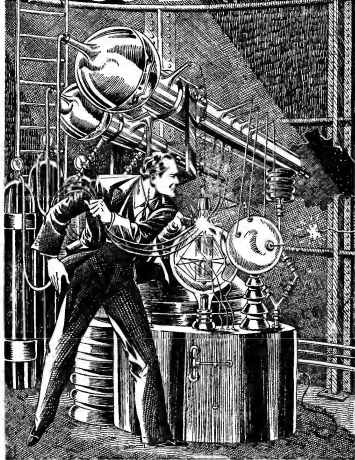
Chance did not look up. His gaze was on Stella.

"Martin!" Smiling, the girl slipped into his arms. There was a sharp click as their glassed-fronted helmets touched.

"Damn!" Chance swore softly. "Of all times to be wearing a space-suit!"

THE END

The SCIENTIFIC



GHOST

BY

ED EARL REPP

Scientific detective John Hale had to use super-scientific machines to track down this uncanny mystery. From his grave avenging John McKenna tried to kill film producer Haverly.



CHAPTER I

A Threat from a Ghost

SIX months after the dirt was shoveled into John McKenna's grave, he was back again—back to threaten the life of the man he had hated.

He came three times into the library of William Haverly. He came with a little tinkling sound like that of a tiny silver bell that is rung, and he left. . . . Haverly did not quite know how. By the time he was ready to leave, Haverly was always in such a condition that he was unable to think or even see clearly. But he left the effect he had intended; he left a man so be-deviled by fear and his own conscience that he lost fifteen pounds in four days. Out of a great motion picture producer, owner of one of the greatest of Hollywood's beehives of celluloid activity, he made an ordinary, scared mortal.

In a sense, it was laughable—that a "ghost," so diaphanous that shots fired into him went through his body like a meteorite through a cirrus cloud, should threaten the life of a man of flesh and blood! The public got a laugh out of that side of it.

The owner of Worldwide Productions could see the other side of it. Because John McKenna had written him a letter the day before he died promising to come back and kill him. . . .

AND one day Haverly knew he could stand it no longer. He got into his car and drove from his Hollywood hills mansion to the modest Los Angeles

They had to, act fast, or the ghost of John McKenna would complete his weird revenge

JOHN
REPP
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home of Dr. John Hale. It was no great surprise to Hale when Haverly called upon him in his home that afternoon. He was used to calls by men in trouble.

For a moment after he seated him, he waited in silence for the producer to speak. His sharp blue eyes took swift inventory of the fleshy body, the thick, black hair, the pouchy face made owlsh by a pair of horn-rimmed glasses. Haverly, too, was busy appraising the tall, dark-haired man leaning by one elbow on the mantel over the fireplace. He eyed the long face and the long nose, the keen eyes glittering behind gold-rimmed spectacles; he noticed with some relief the wide, friendly mouth—the mark of a man who could be trusted to keep confidences.

After a moment he said huskily, "I suppose you know why I'm here. You've read the papers, I guess. It isn't likely anybody in Los Angeles could have missed it."

"I read something of it," Hale nodded. "But I can't say I know why you're here."

"I came to get you to blow that ghost business to hell!" Haverly burst out. "You're the fellow they call the 'Laboratory Sleuth,' aren't you?"

Hale smiled at mention of the nickname reporters had tagged on him some time ago. At first he had been put out when the newspapers smeared the brand of sensationalism on his profession; then, as he found his business doubled overnight, he decided free advertising of that nature had its advantages. Hale had been acting as a sort of scientific detective for years. He had worked in hospitals when a milligram of radium was misplaced. He had been called in by metallurgists when a new alloy would not behave. He had aided archaeologists in unearthing new historical treasures. His fees were high, but not exorbitant in view of the fact

that he was never called until everyone else had failed.

But this kind of work was something he had not attempted. It was hard to get a sample of ectoplasm and find out how the spectre was to be dissolved; hence he had always steered clear of psychic phenomena. He told Haverly as much now. "It's been my experience," he shrugged, "that things like this always clear up if you wait a few days. The hallucination was probably produced by some phosphorescent substance in your walls. Certain agencies might cause the plaster to glow. I'll wager the ghost didn't speak?"

"You're damn' right he did!" roared Haverly. "He threatened my life!"

Hale's eyes, as blue as indigo beneath craggy, bristling brows, sparkled. "Just what did he say?" he wanted to know. A faint smile touched his lips.

"He said—" the motion picture producer hesitated. "He said, 'If you don't turn over the right to the process to my daughter, as sure as God is just I'll kill you! You've got two days more.' That was yesterday. Those were the exact words."

"And what did he mean?"

Haverly's eyes dropped. "Well—we'd had trouble. McKenna was just a fool visionary with an idea. The idea was a half-baked one, but I figured maybe I could work it out. It was an improvement in photographic film. Thinking I might be able to make something out of it, I gave him a thousand dollars. It worked out pretty well, and right away he began shouting robbery. I never gave him a cent more."

Dr. Hale's bony hand went up to rub his chin. He guessed at a lot more than the movie man had told him, and he didn't like the implications. "Granted that your ghost talked," he shrugged. "I'm afraid I'm still not interested in it. It's a little out of my line."

Haverly's fat lips curled disdainfully. "I thought you were a smart investigator," he smirked. "Here I hand you a chance to investigate something not many other scientists have had a shot at, and you turn your nose up at it. Why—this thing has all sorts of scientific angles to it!"

But his cajolery did not fool the other man, for Hale could read character like a spectograph. He realized he was desperate and frightened; he was placing all his hope in him, and was determined not to let him get away.

He asked shrewdly, "Scientific angles? What sort?"

"Why—" Haverly groped for a moment, pursing his lips. Then a light came over his features. "Why, this, for one thing!" He grasped the lapels of his coat, so that they were held out for Hale's inspection. "Look at that cloth—it's cracked like it was glass! Every time this ghost appears the room gets so cold my face feels like it was going to split. There's a sort of a tinkling pop, and then this McKenna is standing across the room talking to me. And it gets so cold that when I move I can hear my clothes crackle!"

Dr. John Hale looked interested. "This popping sound—" he asked. "Just what does it sound like? A twenty-two rifle, maybe?"

Haverly shook his head. "More like a Christmas tree ornament breaking. Only—it's more musical."

"Where has McKenna been seen in your house; just in the one room?"

"Yes. My library. He stands there like he was really in the room, only I can see through him. And the minute he disappears, it starts to warm up again."

Hale said, "Hmm," and frowned. He looked thoughtfully at the man, his bony shoulders a little hunched, and his hands jammed in his pockets. There

was evidently more to this than he had suspected. Artificially produced freezing temperatures were something he could base his investigation on, at least. With a shrug he announced, "My fee will be five thousand dollars. If you still want me, I'll go along with you right now."

Eager to close the bargain, Haverly produced a checkbook and scribbled off the check. Hale folded it and tucked it in his vest pocket. "I'll be right with you," he told the perspiring, red-faced man.

In his laboratory in the rear of the house, Dr. Hale hurriedly gathered together the things he always took with him on cases. Into a little black bag he put a number of instruments which could have been found nowhere but in his own laboratory.

There was, for instance, his spectroscopic pistol. Shaped almost like an automatic pistol, it had a prism in the barrel which shot diffracted light onto a photographic plate in the breech. Developed and examined later, this plate then enabled him to discover the composition of the substance he had "shot." Other items were an electroscope for detecting radioactivity; a tiny camera loaded with exceedingly fast film; a second tiny camera loaded with infra-red film; a thermometer which registered high and low points automatically; and a revolver of .375 caliber, used on occasions when other than natural phenomena were involved.

With everything in order, he shut up his little cottage and left, following Haverly in his own coupe.

CHAPTER II

A Trap for a Ghost

THE small, walnut-paneled study where the ghost of John McKenna had three times appeared did not seem

to admit of much chance for underhanded work by anyone interested in frightening Haverly.

Hale stood in the doorway and glanced shrewdly over the richly-decorated room. Small, deeply carpeted, with leather-bound volumes in shelves set into every wall, it appealed to his scholar's heart irresistibly. At the far end of the room were wide, leaded windows which were flung wide open to admit the summer night air.

The scientist walked across the room and glanced out the window. From the house the slope climbed gently to a brush-covered peak a hundred feet higher and half a mile away. The mansion, set on the hillside above Hollywood, commanded a picturesque view taking in most of Los Angeles and the rolling, sparsely-populated stretches reaching toward the ocean ten miles away. In the darkness Hale could make out moving figures in the shrubbery about the house, and an amused smile played with his lips. There was a veritable army of private detectives about the place!

When he had satisfied himself with respect to the surroundings, the scientist turned to Haverly. "Show me just where McKenna appears," he requested.

The producer's stout body moved across the room to stand against the bookcases about midway down the wall. "Right here," he announced. "But if you're thinking of moving pictures being thrown from the wall, set your mind at rest. I've already had the place taken half apart to look for a hidden projector."

Hale pursed his lips. "Just what happens each time?" he wanted to know.

"About the same thing every time. The first time was two weeks ago. He said, 'You robbed me, Haverly. You've got two weeks to sign the rights to my

discovery over to my daughter. If you fail to do it, you'll be killed.' Well, maybe those weren't his exact words, but that's what he meant. But by God, I'll not give in to the devil! He's dead. He can't hurt me; he can't make me do it!" His fleshy lower lip protruded beligerently.

It was on the tip of Hale's tongue to ask, "Then why did you pay me five thousand dollars to come here?" But after a moment he said, "Well, I'll wait tonight. If he appears I may be able to find something out, but right now I admit I'm as much at sea as you. See that nobody disturbs me. You can send my dinner in, so I won't have to leave."

Haverly nodded eagerly. Probably nothing could have pleased him more than to leave someone else alone in that room where he had spent the most terrifying moments of his life. With assurance that everything would be done, he left and closed the door on Hale.

UNTIL eleven nothing happened.

John Hale grew bored. —when, without warning, the apparition literally exploded into life before him! He was reclining easily in the comfortable armchair, an old pipe glowing warmly, when something seemed to warn him that all was not right. He sat bolt upright, not understanding why he did it, waiting for—he didn't know what. In that instant there came the musical popping sound Haverly had described.

The small noise sounded loud to his keyed-up senses. Suddenly Hale shivered. His face felt as though a dash of liquid air had been splashed into it. His clothes stiffened perceptibly. Every calorie of heat seemed to have been drained from his body and his clothing. He was dimly conscious that his pipe had gone out rather suddenly. In a flash he shook off the momentary fit of inertia and sprang into life.

In the two seconds it took the ghost to appear, he had made himself ready. The spectroscope pistol was in one hand, the regulation revolver in the other. Each foot was on a cable-set that operated a camera previously set up and trained on the spot where John McKenna kept his strange trysts.

Hale stared with wide-open eyes as the elderly man appeared. It was exactly as though a transparent curtain had been rolled down against the wall, and on that curtain stood the inventor. He came forward one step and pointed a long finger at Hale. He was tall and gray, with white skin and dark eyes. He looked feeble, sick. The gray suit he wore needed pressing.

"Your last chance is here, Haverly!" he warned, in a clear, harsh voice. "I had hoped you would listen to me and save yourself. But unless the papers I directed you to draw up are in my daughter's hands by tomorrow, you are a dead man! As surely as you stole my formulae and saved my discovery for yourself—as surely as you are alive and I am dead—I will return tomorrow night and kill you!"

As his words broke off there was a faint click. The cameras had taken their shots. Then there was a louder roar, drowning out the sound of the shutters. A tongue of flame lashed from the powerful revolver in Hale's hand, kicking it back hard. A book in the shelf leaped and was still. A puff of dust arose from it.

The form of John McKenna lasted only a few seconds longer. After it was gone, Hale stood there dumbly, staring in disbelief at a hole in the book, and at the spot where a dead man had just talked to him. Running footsteps jerked him around to meet the frightened men who were approaching.

Haverly sprang through the door, his face ashen. "Did—did you get him?"

he blurted.

"I'm afraid all I got was a fine, leather-bound book," the scientist assured him. "My shot was straight enough, but—he simply wasn't there."

The fat producer stared at his coolness. "But—you saw him?"

"Yes—I saw him. I saw something, at least. And I felt the cold. The exact temperature, by the way—" He turned to the table, picked up his thermometer and read the point indicated by the automatic recording device. He frowned, blinked, then whistled softly. The thermometer went to sixty degrees below zero Centigrade, and right now the indicator was stuck grimly to the bottom numeral, as though it had been fighting to go lower. Whatever the temperature was, it had been far, far below any coldness Earth ever produces naturally!

Haverly saw his consternation. "My God!" he gasped. "You—you don't really think he was there!"

"He wasn't there—not in the flesh, at least. But he wasn't a moving picture, either. He was three-dimensional. He actually came a couple of feet nearer to me. He had depth and bulk." His eyes suddenly grew bleak. A hard side that few men ever saw in him now flared up. "By the way," he breathed icily, "you didn't mention the matter of some formulas to me before."

Haverly started. "I—no, I didn't. As a matter of fact, the only formulae were the ones he turned over when I bought the process."

Hale stared at him calculatingly, but made no comment. "At any rate," he said at last, "McKenna's statement that he'd find you wherever you go is probably no idle threat. He was clever enough to do almost anything. It's my opinion that you'd be as safe here in this room as anywhere. Incidentally, if I don't solve this by tomorrow, it might

pay you to follow his instructions!"

He packed his things hurriedly and left. Haverly was too shocked to say a word, but the dogged look about his mouth showed the advice had fallen on deaf ears.

BY nine o'clock the next morning John Hale knew the problem was one that would command all his knowledge and ingenuity. He knew, also, that it was no more supernatural than he was. Supernatural things did not give a deuterium spectrum.*

This thing, whatever it was, did. He studied the little strip of film closely through a magnifying glass, as he sat on a high stool in his laboratory, then his gaze wandered out the window. Heavy hydrogen was not found at temperatures higher than —200 degrees Centigrade! And that was coming dangerously close to Absolute Zero! No wonder his clothes and face had frozen for a few seconds. If some substance that cold were being released in the room, it would take all the heat energy in the place to give it the warmth it craved.

A frown creased the scientist's forehead as he recalled that McKenna had been intensely interested in low temperatures in the last few years of his life. He had been employed at California Institute of Technology for some time, until he retired to devote himself to his own work exclusively. Just what the photographic process was that he had developed and lost to Haverly—or claimed to have lost—Hale did not know.

Suddenly he remembered the prints he had in the washing sink. He hur-

*Every element betrays its nature by the differences in its spectrum. Thus, Hale was sure it was the isotope of hydrogen, because in the spectrographic record left on his film were the familiar lines of ordinary hydrogen, plus the faint "flaps," as they are called, that denote the presence of "heavy hydrogen," otherwise known as deuterium.—Ed.

ried away to examine the ordinary and infra-red shots he had made of the "ghost." Gingerly he raised the limp, dripping bits of paper from the water. He held them up and scanned them closely.

"Thunderation!" he muttered. Both prints, though fairly clear, were vastly under-exposed. The figure of the ghost was barely visible, though the walls and furniture were cleanly outlined. Under-exposures when the film was the fastest available and the light was good. Either the camera or his eyes were lying, for what that meant was that the vision of John McKenna had only been there before him for a minute fraction of a second, whereas he had actually seen him for half a minute! But his ears could not have lied to him, too. And he had heard him speak for at least five seconds.

He laid the prints on the drying plate and stood there staring down at them. His cameras had never failed him before. But this time they had. He trusted his scientific equipment to the greatest degree, past the point to which he was inclined to trust his own fallible senses. But this was one time he put his human, variable senses above the most expensive paraphernalia money could buy.

For the time being he seemed to be stumped. He racked his brain for clues and at last, in despair, he left his laboratory and folded his long, lean frame into the driver's seat of his car. Half the day was gone and he had found nothing. But there was one thing he had overlooked—John McKenna's daughter. It was just possible that she could tell him something.

CHAPTER III

McKenna's Machines

BUT five minutes with Mary McKenna showed him she could not.

Their brief conversation in the living room of the home her father had left her in Pasadena was little or no help to him. From the pretty, blue-eyed brunette he learned only two things: That only her father's life insurance had enabled her to live decently since his death; and that she detested William Haverly with a whole-souled fervor.

"Of course he stole the process!" she told Hale heatedly, in response to his question. "It was a method of recovering silver from used photographic film with absolutely no waste. Every ounce of silver was recovered by his process. Haverly borrowed the formulae to look them over, and father was just ingenuous enough to let him! That was the last he ever saw of them. The next day Haverly took out patent papers on them." Her full, red lips were bitter as she thought of it.

On a sudden impulse he asked, "Miss McKenna—I wonder if I might have a look at your father's workshop? He was working right up until his death, wasn't he?"

She nodded, and rose. "Nothing has been touched since his death," she told Hale. "He had a whole basement-full of paraphernalia. Most of his work at the last was in low temperatures. I'm afraid I can't explain much of it to you, because it's a little beyond me. But maybe you can figure it out." She led the way down a flight of stairs into an unusually large basement.

John Hale stood and regarded it with admiration for the man whose brain had conceived it. He knew instantly that the room was devoted to the creation of new low temperatures. There was a massive, torpedo-shaped machine that descended through a round hole in the ceiling and tapered down to a small, gleaming pipe. At the terminus of the object was a thick glass cube which entirely enclosed it. Through one wall of

the cube was a device something like a folding telescope, arranged so that the smaller end focused upon a small sphere ending the pipe.

Around the walls were banks of gas cylinders, alcoves filled with machinery, and even a complete compressing plant. Mary McKenna gestured at a door across the laboratory. "His papers are all just as they were left. Although what they mean, I don't know."

"Perhaps I can make some sense out of them. If you don't mind, I'll just stay down here and look around," Hale told her.

The girl readily gave permission and then left, leaving the scientist to make what he could out of the laboratory.

AN hour's study of the machine in the middle of the room told him very little. He discovered the apparatus was not a single-walled torpedo, but consisted of a number of different-sized cells. From this he knew immediately that it was for the purpose of trying to reach Absolute Zero. It was almost a duplicate of the apparatus described by Simon in his report to Oxford University, but was fully twice as large. But the purpose of the telescopic device focused on the chamber in which the low temperatures would be produced mystified him.

At last he went into the little office McKenna had used. He rummaged through sheaves of calculations and formulas. Suddenly he straightened and pulled a paper from the mass.

His eyes swept it intently. The paper was covered with fragments of sentences written in a rather labored hand. There were two predominant phrases. One was: "Realizing the great mistake I have made—," and the other was, "I therefore relinquish all rights to the process."

The paper slid to the floor from

Hale's nerveless fingers. The horrible implication of it was not lost on him. He stood rigidly for a few moments, and then, with a rush of energy, he dashed back into the laboratory. Again he studied the shining apparatus and the instrument panel beneath it. But this time he worked feverishly, trying to learn how to operate it.

He knew the slightest mistake in operation might result in a terrible explosion. The attainment of such low temperatures meant employing liquid helium and hydrogen, and sometimes liquid oxygen. The effect of mingling hydrogen and oxygen would be the most terrible explosion imaginable.

Time sped by as he labored to put the odds and ends of information he gathered into terms he could understand. The sun was sinking low on the horizon when at last he stood back and regarded the machine with a new light in his eyes. The meaning of it was plain to him now. But his mind rebelled at the implication of the device.

"Frozen light!" he muttered. "*Frozen light!* It's—it's inconceivable!" But what other purpose could the series of lenses ending in the freezing temperatures of the torpedo chamber have? And yet such a concept seemed beyond the realm of imagination.

Resolved to put it to the test, he switched on the machine—and held his breath. Like the roar of an unleashed animal, the laboratory burst into sound. From one corner sprang the purple rays of a bank of tall vacuum tubes, the weird glow casting long shadows from the instrument across the floor. The great condenser-torpedo vibrated as its interior surged into life, and from within it emerged ominous cracklings.

Then, into the glass sphere ending the torpedo, shot a narrow beam of pinkish light. As though glass were a screen to

stop it, the light ended abruptly as it came in contact with the concave wall. But inside the globe there built up a dense reddish fog that grew more opaque with each passing second. Hale's eyes darted to the instrument panel.

"Minus two hundred and seventy!" he read. Three degrees short of Absolute Zero! And even as he watched, the needle quivered lower, until finally it came to rest. Kelvin's theoretical point of lowest coldness had been reached!

The time had come for the test. Hale sprang to the switches and threw two more in. Simultaneously a new, soft buzzing came from the amplifier stationed in the glass cubicle below the refraction system, and a brass shutter over the end of the telescope-like refractor-shield clicked down, leaving the glass ready to receive light impulses.

The scientist darted before it, and stood staring into the large "eye" at a distance of about ten feet. Suddenly he spoke. "Nernst was wrong, McKenna. Infinite entropy is as possible as infinite disorder among atoms. For you have reached it. Your attaining of Absolute Zero has proved that!"

Then, hurriedly, he went to the machine and shut all the instruments off. The unnerving roar ceased. The shutter over the refractor snapped back in place. The vacuum tubes cooled gradually. And in the little sphere there was left none of the beam of pinkish light—nothing but a tiny red droplet no larger than a pea, that glowed and burned with a cold, unearthly light.

Hale rushed to the glass cube and swung down the bottom of it. His hand reached up to the sphere. A tiny knob beneath it released the little red bead. The tall, intense scientist whirled and flung the object across the room to smash into the concrete wall.

Once more, as in Haverly's study, there was an ominous popping noise, followed by unutterable cold. In the next moment Hale's startled eyes saw a man materialize before him, a man who was dark-haired, tall and slender, and who wore gold-rimmed glasses. He spoke, and the voice was his own.

"Nernst was wrong, McKenna. Perfect entropy is as possible as infinite disorder among atoms. For you have reached it. Your attaining of Absolute Zero has proved that!"

WHEN the shock had worn off, Hale shook himself as though chilled to the bone. He hurried upstairs. Mary McKenna was waiting for him in the living room. "Miss McKenna!" he blurted. "Did your father ever mention going near Haverly's place?"

"Why—yes, he did," the girl frowned. "He took me with him one day on a drive over Hollywood. We stopped by an old water tower above the mansion and he seemed interested in it."

"Can you find this again?"

"Yes, I'm sure I can. It's in a clump of trees, but it's easy to find."

"Then we've got to get out there immediately. Haverly's life depends on it. Perhaps he doesn't deserve our help anyway, but—after all, it's a life."

CHAPTER III

Death Trap

AS the coupe rolled swiftly along Colorado Boulevard, the girl turned fearful eyes toward the scientist. "Do you mean you've found what father was trying to do?" she asked.

"I'm afraid I have," Hale told her. "Your father was as clever a man as ever heated a test tube. He achieved what physicists have thought was im-

possible—he reached Kelvin's Zero."*

"I remember his fuming about that long ago," the girl recalled. "He never did believe the physicists were right. But how did he do it? And how does that affect Haverly?"

"He did it by employing powerful magnetic charges on minute objects," Hale said, frowning. Even though he had operated the light-freezing machine himself, the exact method puzzled him greatly.

"This magnetization method has been more or less the formula used by others, but McKenna carried it much further than they. He discovered how to magnetize a substance much more heavily than those who preceded him. And when he knew he could hit this point, two hundred and seventy degrees below zero, he began wondering what would happen then.

"He knew that Einstein's theory that light has mass gave him a fulcrum for the lever with which he intended to move the scientific world. He knew, too, that since all atomic motion stops at Absolute Zero, the mass of any substance would be terrifically reduced.

"Most of the mass of an atom, of course, is in the spaces between nucleus and electron. If this space were closed and the nucleus and electron drawn together, which would be the result of the cessation of atomic motion, the body of a substance would be reduced to perhaps a thousandth—or more probably a millionth—of what it had been.

"Then, since light has mass, and anything having mass can be frozen to Absolute Zero—he discovered it was possi-

* Simon, F., "Approach to Absolute Zero of Temperature," lecture delivered at Clarendon Laboratory, Oxford 1935. In this lecture it was pointed out that Nernst's Theorem postulated that the state of lowest energy must be a state of perfect order and that, therefore, since perfect order is impossible, lowest energy—or Absolute Zero—was also impossible.—Ed.

ble to freeze light itself! This was not so complicated as it sounds. He simply directed a cold beam onto the light rays as they piled up in his refractor. They were, so to speak, 'frozen' in layers, the substance that carried their undulations and added to their mass being the ether in the evacuated sphere."

"It seems incredible!" the girl mused.

"Incredible, yes—but no more so than Einstein's 'light-mass' theory. And, like it, it has now been proved. A little more believable, perhaps, is his other discovery that the undulation set up by sound waves could be frozen in the same manner, and that on releasing them again by heating, the sound waves carried on in the same path they had been taking—unchanged. The reason I could see and hear your father's image for some time while the camera saw him less than a second was simply that all these sound- and sight-undulations were released almost simultaneously—and yet in the same order in which they were frozen. The eye and ear are imperfect organs and could only become conscious of these impressions slowly. The camera, being open for only a fraction of a second, caught the vision before it in that second."

While they had been driving they had reached the hills and now were rapidly winding through the untraveled concrete roads leading up the hills. It was after ten, for Hale's work in the laboratory had taken hours. A cry of eagerness slipped past the girl's lips as they rounded a curve.

"There it is!" she cried. "The old water tower! Look, down there in the trees!"

In a flash John Hale pulled on the brake and sprang out. His eyes flashed over the setting. A perfect one for the murder, he reflected. Far below them in a little glen lay Haverly's house.

Low-growing shrubs and brush left an unimpeded path between house and water-tower. The light in Haverly's room showed as a tiny square of yellow light, and inside, he knew, the producer was sitting, frightened out of his wits. Remorse brought a scowl to the scientist's forehead as he recalled warning him that McKenna's threat to find him wherever he was would not be an idle one.

For he knew now that it had been the dead man's way of being certain his victim would be in that room. Agoraphobia, common to men in Haverly's predicament, would keep him chained there like a prisoner!

In Hale's right hand, as he sprinted down the slope to the tower, was clutched his little black bag. The girl was right behind him when he reached the tower. Hale stood looking up at it for a moment. Long unused, it was mossy and sombre now in its setting of dark trees. Hale walked slowly about it, looking for something. After a moment he stooped down rather hurriedly.

Flush with the ground there was a irregular opening about a foot high and two feet long. He shot his flashlight through it and caught the gleam of chromium and copper—unusual furnishings in a deserted water tower! Hurriedly he sat down and thrust his legs through the opening. Wriggling and struggling, he made his way inside. As he stood and flashed the light about him, the girl slid easily through the aperture.

He unscrewed the lens from the flashlight and set it on the floor, the little globe faintly illuminating the place. A breath of satisfaction hissed through Hale's clenched teeth. Fronting the opening, and back about six feet from it, were the two small, cannon-like pieces of apparatus he had expected to find. One was small and slender of

barrel, set on a heavy tripod. At the breech of it was a large, cylindrical magazine, connected by copper tubing to a compressor tank on the floor.

The other gun was three times as large, with a barrel about five inches in diameter. This one, too, was connected to a compressor.

"What—what are they?" Mary asked tensely.

"The small one is the cause of the ghosts," Hale said through tight lips. "The breech of it is a small low-temperature machine in itself, keeping a number of small pellets at Absolute Zero. Once they were frozen that cold, it was not hard, with compression and liquid helium, to keep them that way. From the muzzle of this gun, by compressed air, are fired the little bullets that give rise to the speaking ghosts that have threatened Haverly. Accurately timed, they fire one every night at eleven. The other gun—"

A click broke his words off. From the larger cannon came a pumping sound, as though pressure were being stored up. Hale started and shot a look at his wrist watch. "Good Lord!" he gasped. "It's eleven now! *The cannon is getting ready to fire!*"

A dozen plans flashed through his brain. He stood hesitantly in the center of the room. In a few seconds that cannon would fire—and God knew what the result would be!

Frantically he began ripping out wires and connections, and Mary, too, followed his example, but futilely, for the cannon continued to pump.

Then he seized on a thread of hope. In two strides he reached the window. He whipped out his powerful revolver and aimed at the Haverly mansion. Six times the heavy weapon crashed and bucked against his hand. Seconds later the echoes of breaking glass reached their ears. Faintly, in the light stream-

ing from windows, he could see shapes rushing past windows.

And suddenly a great gust of released air burst from the cannon.

The cement floor of the tower shook so that the flashlight toppled over on its side. Air whistled through the tiny window. From the house a half mile away they heard—nothing! A tremor shook Hale.

He rushed to his little bag and took out the regulation spectroscope he carried. Sighting it on the far-off window, he scanned the lines. In the colored threads that spread out on the diffraction grating he read the doom McKenna had planned for greedy William Haverly.

The lines of carbon and oxygen were heavy and bright. Hale let the instrument sag to his side and breathed deeply. The girl whispered, "What was it?"

"It was solid carbon monoxide," Hale breathed. "Your father did not rely on the force of his weird cannon ball to kill Haverly. If it failed to crush him, the release of monoxide as the solid-gas cannon-ball warmed up would asphyxiate him."

She moved close to him, darted a terrified look at the mansion. "Do you think—it killed him?" she asked in a whisper.

Hale's hand found hers. He gave a reassuring squeeze that did not express the fears in his mind. "I hope not," he said shortly. "I hope my shots scared him out of the room. Well, we'd better get down and see."

The first face they saw on entering the Haverly mansion was the pasty, terrified countenance of William Haverly himself. Hale's shoulders slumped with relief. Mary McKenna choked out a little sob of relief. Though Haverly might have deserved death, she had no wish to think of her father as a murderer, even if a post-mortem one.

"Thank God you heard my shots!" Hale burst out.

"Heard 'em!" gasped Haverly. "One of them took the padding out of the shoulder of my coat! I got out as soon as I could then. And just in time. I heard an explosion in the room, but there wasn't a thing harmed. But the air is still absolutely unbreathable in there!"

He led the way nervously to the study. Hale's eyes pinched as he stared through the door. Then he saw a crumpled paper on the floor. He picked it up. Abruptly, his fist wadded it and he thrust it in a pocket. He knew what it meant, and thanked his stars Haverly hadn't seen it.

Now a nervous laugh from the moving picture man called Hale's attention. "I guess the five thousand I paid you was cheap at that!" he vowed. "If you hadn't warned me out of there . . ." His face mirrored the horror in his mind.

Hale shrugged. "You were lucky," he said curtly. "I only hope you'll be as lucky—next time!"

"Next time!" Haverly stood rigid, his eyes big behind horn-rimmed spectacles.

"You don't think," John Hale said sarcastically, "that a genius like McKenna would rely on one attempt to do the job! My dear man, if you survive the next two weeks, I'll be the most surprised scientist in the world!"

He took Mary's arm and they started for the door. But Haverly lurched forward to grab his shoulder. "But you've got to stop him!" he cried in terror. "My God, Hale—I paid you good money—"

Hale shot him an annoyed glance. "The five thousand dollars," he explained patiently, "covered my services in detecting the actual nature of the 'ghost' and his methods of working. I've

done that already. My report will be mailed tomorrow."

The producer gulped. "I'll double it—triple it!" he blurted. "You've got to help me, Hale!"

"I'm sorry," Hale shrugged. "From my standpoint, the case is too—dirty, I might say. I don't think it's the sort of thing I care to mess with. To be quite frank, I think you deliberately stole McKenna's formulae from him! The only consideration I'd be interested in would be a paper assigning to McKenna's daughter all rights to it, as well as fifty thousand dollars punitive moneys."

Haverly's face grew crimson. He balled his pudgy hands into fists. "Then you can go to hell!" he shouted. "Get out. I'll get somebody else to do it!"

Hale smiled. "Sure," he said, "you do that. There's a gentleman in Vienna who takes cases like this. He's an amateur, but they say he's solved one or two. If you hurry, you might get him here in three weeks—in time for the funeral!"

He took the girl's arm once more and led her to the door. Haverly stood watching him. His face was a battlefield of emotions—greed, terror, hate. But as the door started to close behind the pair, he rushed forward. "All right!" he panted. "I'll do it. I'll write the paper now. Only, for God's sake get back to work and track down every device the fiend may have set to get me!"

Hale winked at the girl, and went back in. . . .

IT was ten minutes later that they drove back out of the estate. Mary McKenna was bewildered but happy. Suddenly she asked, "But, how do you know father had other plans besides the cannon?"

"I don't," Hale chuckled. "You see, sometimes bluffing works better than laying your cards on the table. This is

another case where it did. What I didn't tell Haverly was this: John McKenna didn't want that cannonball to crush him! He had it planned so that the gas would explode instantly and stun him. While he lay unconscious in the room, the monoxide would finish him. And when they found him there, they would think it was a heart attack—and they would find a confession admitting his theft and returning to you everything he took!"

Mary gasped. "But—how could

that—?"

"Your father was a genius, Mary," Hale said. "For who else but a genius would think of freezing a forged confession within that ball of solid monoxide, so that when it melted the paper would be found beside the dead man?"

The girl was stunned. And then she relaxed as understanding came to her. "So that was what he was doing in the laboratory all those months—"

"That was it," he nodded. "And it achieved his purpose, even if it failed."

THE END.

» TAKE A CHANCE? «

Chance can be, and usually is, determined with great exactitude by mathematical computation, provided the premises are correct and enough entities enter into the case. Life insurance companies know the average age at which a given group of insured will die. Some may die at 60, and others at 80. But the company does a successful business based on chance. Gamblers are not always honest, but an honest way to gamble is to rely on the law of averages. A proprietor only has to know the chance average of his various games in order to list the chances on a profitable basis. No one can tell how a coin which has been flipped will land, but he can make two guesses, one of which will be right. In the long run it will land heads or tails an even number of times. It has been proven by tossing six dice simultaneously ten thousand times that all faces come up so similarly that the variation is only a fraction of one per cent. The flight of millions of birds flying in all directions may be accurately counted as they pass through an imaginary plane in a vertical position. So never count the chances against you. They are really even.

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By
**JOHN
RUSSELL
FEARN**

CHAPTER I

A Meteor

DOCTOR ASA CROMWELL'S extraordinary scientific knowledge and deep rooted fear of war certainly led his genius into strange channels. When the war scare of '37-'41 was rife, when it seemed inevitable that nation would rise relentlessly

against nation, he turned his far reaching intelligence to the devising of machinery for the immediate protection of his own home, the extensive land he owned, and, if they'd have it, his country.

Living some miles outside Trenton he was definitely free of the bustle and disturbance of city life. His home was a detached one with laboratory annexed, wherein he worked steadily,

Was the screen about to reveal the secret of Midge Cromwell's power?



aided by his wife until she died in late 1948. At that time, however, his daughter Madge was well old enough to understand most of the science on which she had been quite willingly nurtured. Having more than a natural taste for things scientific, loving her father heart and soul, she made him a perfect assistant. They went on laboring together until 1956.

Ironically enough the war scare had ceased then. Peace was being talked all over the world. And therefore Dr. Cromwell's brilliant inventions, when he tried to sell them, were practically of no value.

About this time young Edward Melton dropped into the scene. Refreshingly impudent, blond headed and square jawed, he made no secret of the fact that he enjoyed his job as a traveler in metals, covering one end of America to the other in a smooth running sedan. It was an order for tungsten alloy of a special grade that brought him to the massive, solitary Cromwell residence.

The Doctor himself was brief, curt as the very devil in fact, and Ted Multon for once wished tungsten alloy was not in his line. Then he caught sight of Madge and had a brief talk with her. From then on his interest in tungsten alloy was enormous. And so he gradually merged, in what spare time he had, into being a part of the Cromwell setup.

When his travels brought him near Trenton he spent the time with raven headed, white skinned Madge at every opportunity—that was when he could get rid of Cromwell, whose eye for romance had gone blind long ago.

"Think of it!" cried Cromwell, one night. "This spot on earth, this one stretch of good American soil which I own, is utterly indestructible!" He went to the open French windows and stared out on the mellow dark of the

July evening. He was an odd, bent little figure, acid stained hands clenched behind him. "I have wrought a lasting peace out of machinery," he went on slowly, half to himself. "No thing of man's making can ever hurt me or my dear one. Here—right here—is paradise!"

"Yeah," agreed Ted laconically, and his blue eyes were intensely bored. He reflected that paradise might take several forms.

"Do you realize," Cromwell said, turning swiftly, "what I have accomplished?" He came back into the comfortable room with a certain challenge, pointing his toes as he walked. As ever, his lean, clever face was massed into a thousand wrinkles of concentration; his high brow was furrowed, his gray hair awry.

"I have mastered the forces of the atom, I have created energy shields that can deflect the mightiest bomb ever made, I have created molecular disrupters that can shift matter itself—can destroy a building of steel in five minutes. I could, if I chose, be master of the world," he finished softly.

Madge laughed a little. "Oh, dad, don't be so absurd!" she rebuked him. "Master the world! What good would it do you?"

"None, I suppose," he confessed; then added with a grim frown, "I could, just the same. The machines I have got . . ."

"Say, I smell something!" Ted interrupted suddenly, sitting erect and sniffing. "Smells like water spilled on a fire."

Cromwell started. "Good Lord, my heaker!" he gasped. "I'd quite forgotten it. . ."

He went out of the French windows at a run, vanished over the dark garden to the lighted expanse of laboratory. Ted grinned faintly as he looked

at the girl.

"Grand old dear, isn't he?" he murmured.

The girl's straight, sensitive features were just a trifle drawn in sudden anxiety.

"The best in the world," she answered slowly, "but sometimes, Ted, I feel sorry for him. He's spent all his life making these engines of destruction—" She sighed heavily—"and now there's no need of them. At heart he's embittered; I know it. He's been that way ever since mother died. Sometimes I wonder..."

She stopped, looked round with concerned dark eyes.

"Wonder what?" Ted prompted gently.

"If his natural pride will get the better of him one day. Believe me, Ted, his talk about world mastery is horribly true—that's why I laugh it off. If he really became serious about it—even I could do it if I was so minded."

"Huh? Good Heavens, you're not implying—"

"Of course not," she smiled. "You know me better than that... Besides, I've got you now. I've pretty well finished helping dad. We're engaged—in two months we'll be married. What would I want with such inventions, anyhow? It was different when war was such a grim danger. My only worry is that dad, left to himself, brooding constantly over those machines, might do something really dangerous."

"Needless worry, I'm sure," Ted said quietly. "A man of his genius has got all the balance necessary, don't you forget it. He won't go off half cocked. Besides, we'll keep looking in on him to see he's all right and—" "Look!" he broke off suddenly, with a hoarse cry, and his hand darted upwards to point through the French windows.

The girl looked up just in time to see

a blinding streak of fire blaze across the heavens. The scream of tortured air sounded like an express train roaring out of emptiness. For an instant the grounds of the house, the immense adjoining laboratory, the whole landscape beyond, were flooded in brilliant green radiance—then the monster meteorite had dropped over the western horizon.

There was a dull, remote concussion, the faint shaking of the ground that made loose articles give a momentary rattle... Then darkness and stillness had returned.

"Gosh, *what* a meteor!" Ted managed to gasp out at length. "I wonder where it dropped?"

The girl had risen to her feet. "Didn't seem very far from Norristown to me. If it really did drop there..." She left her sentence unfinished as her father came tearing in from the garden.

"Did you see it?" he gasped hoarsely. "About the biggest thing since the Siberian meteorite. I was standing at the lab window as it went over us."

"Hardly as big as the Siberian meteorite, dad," Madge corrected gently. "Pretty large, yes, but don't forget the actual size would be smaller. The expanding halo of gas around it caused by the friction of—"

"Don't try and teach me science, young woman!" the scientist broke in curtly. Then he strode vigorously across to the newscasting machine and switched it on.

The New York relay station had no intimation of the occurrence neither had Trenton. Impatiently Cromwell switched over to the Philadelphia relay. For a while there was nothing unusual, then the cold mechanical voice, synthetically created, spoke deliberately.

"A meteorite, measuring twelve feet in diameter or thereabouts, spherical in form, has dropped a few miles east of

Pottstown and buried itself in a crater roughly approximated at eight feet in depth. Fortunately little serious damage has been caused. The particular area where it fell is pasture land, the main damage being to crops. The glare was seen as far east as Mid Atlantic and as far west as Los Angeles. Investigation will commence when the meteorite has cooled—"

"Huh!" Cromwell switched off impatiently. "Is that all? Just another chunk of iron out of space. Why doesn't something exciting happen?" he demanded. "Why couldn't it have dropped near here?" "And choked us with superheated gas?" Madge asked pointedly. "Hang it all, dad! Good job it fell where it did, if you ask me."

"Make a note!" her father ordered briefly. "It'll take about three days for the meteorite to cool; then we'll go and examine it. May be interesting. . . ."

He went out slowly as the girl nodded assent. Ted turned to her.

"Well, I guess our trip is flat," he sighed. "Pity. . . ." He glanced at his watch. "Well, I'll have to be going. I'm on a tour that'll take me to Bridgeport and New Haven tomorrow, so for a month at least we'll be separated. I'm making my base in New York, so I can be in touch with the firm. You can find me at the Grand Western Hotel. . . ."

"I'll remember," the girl smiled, as he kissed her gently.

CHAPTER II

A Strange Death

ABSORBED by the unusually busy spell which ensued during the next few days, Ted had little chance to think much of Madge, though he did read in the papers and hear over the public newscasters that parties of scientists,

Madge and her father among them, had visited the fallen meteorite upon its cooling, discovered that it was not the conventional nickel iron affair, but composed of a metal of tremendously high fusing point.

In fact, the fuse point was so high there was nothing in earthly science that could even make a dent on the cooled metal.

Scientific institutes and museums began to bid against each other for the possession of the object. The former wanted to study it; the latter to have it as souvenir. The New York Museum of Natural History won, backed by public opinion. In the Museum the thing could be seen by an interested populace; in the scientific institutes it would just vanish from sight. And, on being transported to New York, the thing was further rendered a mystery by being far lighter than its mass suggested—unless as one observer suggested, it was really hollow. . . ."

Telephoning Madge, Ted learned that old man Cromwell was deeply annoyed because he couldn't get a piece of the meteorite to study. Besides, his bitterest rival in the scientific world—Justin Cavit—had openly laughed at him. Nothing was more calculated to make Asa Cromwell burn. . . . So now, according to the girl, he was working feverishly on ways and means of destroying impregnable metal, pottering around in his laboratory day and night.

A few more days of traveling, haggaining and huying, then Ted returned to his New York hotel one evening to meet up with a surprise. Madge was seated waiting for him, her face drawn and strained, her big dark eyes enlarged and red from weeping.

"Why, Madge dearest, what on earth—?" Instantly Ted was at her side, soothing her gently as she burst into another fit of crying. He took her

slim shoulders rather roughly, forced her to look at him. For the first time he noticed that she was all in black.

"What is it, honey?" he murmured. "Don't cry—please! You can tell me. Is it—your father?" he asked slowly.

Madge nodded bitterly, her lower lip quivering.

"He's—he's dead, Ted. Heart failure—Or anyway that's what the doctor said. Somehow I can't believe it . . ." She broke off, twisting her damp handkerchief; forced herself to be calm. "Oh, I haven't known what I've been doing the last few days," she muttered. "Such a whirl! I tried to get you here, but they told me you were away for a couple of days—"

"I'm sorry," he said quietly. "Business kept me away from New York. Please go on. . . ."

"Dad died—died three days ago, the day after you telephoned me. It was late in the evening, nearly dark. I was in the library and I heard a sudden scream from the laboratory. French windows were open. When I got to dad he—he was dead. Buried him today then . . . Then I came to find you."

She sank her dark head on Ted's shoulder. His arm embraced her shoulders again.

"O. K., take it easy," he soothed. "These things have got to happen, you know—will go on happening until science finds a way to defeat death. . . . Funny, though, him dying of heart failure like that. Didn't strike me as that sort of a man."

"There are so many things I don't understand," the girl mumbled. "The lab was all upset, just as though there'd been a fight of some sort. A heavy instrument stand was overturned too—so heavy I couldn't lift it up. I don't know how dad's slight form came to knock it over— Oh, I don't know *what* to think!"

"Was anything stolen?" Ted asked sharply.

"Not a thing; that's the queer part. And since dad was dead he couldn't tell anything, of course. Still, the doctor said heart failure, probably brought on by extreme shock."

"Odd. . . . Damned odd," Ted muttered. "What a pity you didn't think of taking an ultra violet photograph of his eyes after death; the retinae would have retained the last image for quite a little time."

"I did," she sighed. "It was a horrible job—and fruitless. It only showed a vision of me in the doorway, which was quite natural. Dad couldn't have been quite dead as I entered—died a second or two afterwards. . . ." She shrugged and relapsed into moody silence.

Ted scratched his blond head rather helplessly. "Well, I guess there's nothing I can say. To offer sympathy is so darned conventional. Is everything well locked up at home?"

"With all the combination locks," the girl answered, trying hard to smile. "You remember how impregnable dad made his laboratory. It's safe enough. As for me, I've got the room next door, complete with my trunk and bags. I'm staying here for the rest of the month until you're through with your job, then we can go back to Trenton and decide what to do."

"We'll get married, that's what," he answered firmly. "And now, young lady, you're coming downstairs to have a good meal."

MADGE duly domiciled herself in the Grand Western Hotel and tried as best she could to overcome her grief. By the following morning she had herself much better in hand, was almost cheerful as Ted left her.

When he returned in the evening he

received a tremendous shock.

Madge had gone—completely! There was nothing mysterious about her actual departure; the riddle was her reason for doing so. The reception clerk laconically observed that she had checked out during the afternoon, taken away the luggage she had brought the previous evening, and had left no forwarding address.

Ted was simply dumfounded. It did not make sense for her to walk out like this without a single word of explanation. Harassed he tried to think of something he had said to offend her, but he could only recollect her gentle kiss in the morning, her smiling promise to look forward to his return.

From the moment he left the reception clerk Ted lost all sense of time, went in and out of the telephone booth almost continuously, ringing up the Trenton house—Always the same singsong response—"No reply, I'm sorry."

He tackled the commissionaire and was referred to the taxi drivers. Here he got hold of one clue, at least. One driver had taken the girl to the Pennsylvania Railroad Station. Immediately Ted went there and pestered officials and booking clerks, but they couldn't help him. He didn't even know what clothes she had been wearing. She might have taken any train anywhere. The thing was utterly hopeless.

From the station he again telephoned Trenton. Still no answer. Desperate, he got out his car and streaked through the night, reached the great residence some time after midnight and found it locked and deserted. The girl was certainly not there; had vanished as completely as if into thin air.

Into the morning of the next day he worried police and detective bureaus, did all in his power without finding any further clues. Finally there was nothing for it but to leave things to the po-

lice. Exhausted, unutterably miserable, he returned to his New York hotel and went straight to bed, worn out.

Ted abandoned work, abandoned everything in the weeks that ensued, spent all his time, day in and day out, trying to locate Madge. His hard earned savings began to deplete alarmingly.

In a month he was a ghost of his former hale and hearty self—was unshaven, huffed, badly groomed. Certain tact observations by the hotel management jerked him into a sense of decency and he took himself in hand. Then one evening, as he sat puzzling in his room, the telephone bell rang sharply.

Wearily he lifted the receiver.

"Ted?" came a familiar voice. "Oh, Ted, thank God it's you!"

"Madge!" he yelled, leaping up. "Madge darling, where are you? What in Heaven's name is all this about?" His fingers dug hard into the receiver.

The girl's voice was tense and low pitched, clearly nervous.

"Ted, come to me!" she implored desperately. "I think I'm going mad! It's awful! I'm at home, and—"

Her voice stopped abruptly, her sentence ending in a low gasp. There was a click, then the line went dead.

Ted slammed the telephone down, grabbed his hat and went downstairs like a whirlwind. Within seconds he'd gotten his car from the garage, within minutes he was in the thick of the New York traffic.

He drove resolutely through the night and reached the Trenton residence around 1:30 in the morning. It stood in dark isolation against the moon, unlighted, apparently still deserted. Ignoring these evidences he raced to the front door and slammed heavily on the knocker, punched the bell, waited anxiously as there was no answer.

Then to his intense relief lights came

up in the hall—he heard footsteps. The door opened gradually and Madge's slim, smoothly rounded figure was silhouetted against the streaming glare.

"Madge!" he cried thankfully, strode forward and crushed her slender body in his arms, smothered her face in kisses. "Oh, darling, thank God I found you again!"

He broke off and looked at the girl in surprise as she very deliberately pushed him away from her. Her lovely face was set, curiously hard.

"Don't, Ted—please!" she ordered quietly. "That sort of thing is all finished with. Everything's finished—between us."

Ted stared at her, could find no words to say. She was smiling a little now, an aloof coldly cynical smile that looked foreign on her sensitive mouth.

"I've come to a decision," she went on steadily. "In fact I came to it that day when I walked out of the hotel. I suddenly saw myself for an absolute fool! The whole world at my feet and nothing being done about it! A laboratory full of stuff to bend humanity to my will, and I just let it lie there and rot. Dad died giving his all to those inventions. The least I can do is to use them!"

"But—but dearest, I can't believe my ears!" Ted stammered, staring at her in the bright light. "You sound like a different woman entirely. We were going to be married. . . ."

"Marriage!" Her lips were scornful. "Good Heavens, Ted, that is out of the question. Maybe it was dad's death that brought me to my senses."

"Or else drove you out of them!" Ted retorted, flushing hotly. He suddenly seized the girl's silk clad arms in an iron grip, shook her fiercely. "What's all this about?" he snapped. "For one thing, what are you doing fully dressed at this hour in the morning?"

"Any objections?" she asked icily,

jerking her arms free. "I'm checking over the resources of the laboratory. In a couple of days—maybe sooner—I'll put my plans into action."

"But your phone call!" Ted burst out frantically. "You said you needed me, then broke off suddenly with a sort of gasp."

She shrugged. "Guess you're right. Just for a while I wavered in my intentions, was weak enough to send for you. You must have imagined the gasp. I only rang off because I realized what a fool I was making of myself when I'd otherwise gotten everything so nicely in hand."

"I see." Ted studied her cold gaze and felt himself tingle with a sudden desire to slap her violently in the face. Why that idea got hold of him he did not know. He was only conscious of an intense change of feeling toward this now cold, statuesque woman to whom his heart had been given.

"Listen, Madge," he said thickly; "you don't realize what you're walking into! A life of massacre and crime—that's what it amounts to. You can't do it! I won't let you do it! You're unhinged or something through the death of your father—I'm going to stop you!" he finished desperately.

Her dark head shook. "No you're not, Ted. Nobody's going to stop me, because nobody *can* stop me! You should know that by this time!"

"But, Madge—"

"Get out!" she commanded bitterly, and he stared back in amazement as her white hand reached momentarily into a sash about her waist and produced a gleaming revolver.

"And remember," she resumed grimly, her lips hard and set, "I'll not have you around me any more. Whatever there was between us is finished now. The old sniveling Madge Cromwell is dead; instead there remains the

future conqueror of the world. The only woman in history to master a planet. Now—go!”

Too confused to think straight Ted jammed his hat back on his head, backed to the door, the girl's queenly form following him up relentlessly. His last vision of her was her unwavering automatic, the cold stare of her dark eyes, then the door closed in his face and he was out in the cool night wind.

CHAPTER III

Empress of the Earth

THREE days later, at eleven in the morning, a neutral airplane of bombing dimensions—neutral in so far that it bore no insignia—was sighted at 5,000 feet over Central Park. Aeronautical experts were interested, but puzzled. The plane had no right there, was directly out of the ordinary trade and passenger lines, and since planes were required by law to be identified the matter was distinctly a mystery to officials.

Sky police patrols set off to question the flyer—only to discover that the machine turned tail and flew at unbelievable speed westwards. The police patrol returned to earth.

Then at three in the afternoon the mystery plane returned, circling slowly in ominous wide sweeps directly over the dead center of Madison Square. Its silence was disquieting.

People stared up at it with shaded eyes; the airway bureaus got busy again. Then all New York was stunned into amazement by the sight of four investigating police planes crumbling to pieces in mid-air! Nothing was visible near the stationary interloper, no rays of any kind, yet as the police patrol swept forward they smashed into atoms at a distance of five hundred feet from the strange plane, dropped in flaming

ruins on the metropolis below.

The possibility of invasion flashed across the minds of the people. The vessel still circled slowly. Then from the newscasters there suddenly burst a howl of interference, wiping out the intoned news of the hour. A woman's voice, slow and measured, spoke.

“People, I am Madge Cromwell. An ordinary name, but remember that Asa Cromwell was my father, and the greatest scientific genius of this age. He invented armaments for your safety, which you refused; he went to the very ends of scientific research so that you might have peace and security. You refused it! There can only be one answer to such dolts. The weapons that could have protected you will be turned against you! I make no demands, no ultimatum, I demand no particular obedience because in the end that will be an easy thing to obtain. Those of you who wish to come to my side after I have proved my powers may signify that fact by gathering in the desert regions of Arizona. You will then receive further instructions. I have power—infinite power, and shall use it. Watch!”

The voice ceased. The monster air machine suddenly moved to one side, darted like a striking eagle to the north and circled again between Wall Street and Broadway. People below, drawn by that radio communication, stood watching open-mouthed—then something happened.

A pale violet beam stabbed from the bottom of the vessel, swept ruthlessly over the buildings that imprisoned Wall Street. In an instant the canyon of finance was a mass of flying bricks, shorn off steel girders and crumbling glass. Whole tops lifted off buildings like built up cards scattering in a wind—came shattering down on the screaming, running populace below.

Madge Cromwell had struck the first

blow—and it was only the beginning.

As the frantic people stormed and swept in the debris littered streets, as ambulances flew desperately to the grim scene, the big plane swept onwards on its tour of destruction. Nothing seemed able to withstand that relentless beam.

Broadway was the next to be attacked. Huge, smoking holes were torn in solid concrete, buildings caved inwards, subways sloughed and shattered into the depths and imprisoned those underground. Then onward to the harbors and docks where the sea boiled under the impact of the beam and ships vomited skywards in a million pieces under its inconceivable power.

Back again up the river, and Brooklyn, Manhattan and Williamsburgh Bridge went one after the other, left behind a story of inhuman massacre and destruction.

In the course of that ghastly afternoon over 20,000 people died, and twice the number were seriously injured by flying splinters and collapsing buildings.

Madge Cromwell had declared merciless war—a war that enraged America was eager to fight. Entire armadas of attackers started off in pursuit of the bomber as it zig-zagged on a trail of destruction which incorporated Long Island, Fifth Avenue, the destruction of the Empire State Building, the wrecking of Central Park, and the smashing of George Washington Bridge into fused and twisted girders.

The avenging fighters swept with ruthless savagery on the black invader, but they suffered the same fate as the police patrol. Every machine within five hundred feet of the invader crumpled up as though hurled into a steel wall at three hundred miles an hour. They shattered down and added their load of fire and ruin to the chaos below.

With a calm ruthlessness that was

terrifying the killer plane's beam lifted for a moment from the destruction below and turned its attention to the attacking squadrons. They were simply sliced out of being, cut in half, blown into thin air. Bullets, shells, anti-aircraft guns—they made not the least effect on the strange plane.* At five hundred feet every attack was deflected, and for retaliation instant searing death rained down on the defenders.

And Madge Cromwell was behind it all! Ted went sick at the very thought of it. All the love he had ever had for her turned to burning hate. This senseless, inhuman slaughter; the screamings from the street outside the so far untouched hotel, the thunder of explosions as edifice after edifice was slashed out of being.

He rather wondered about the airplane itself. He had never seen it before and presumed it must be an ordinary fast bomber equipped by Madge.

Towards evening the plane departed westward with its usual terrific speed, pursued until it outdistanced the defending planes. By now the whole country was ready. Planes were everywhere, came from every city and coastline, pursued the invader until the late evening—according to the newscasters. Then at nightfall it was lost, due mainly to silencers on its engine which defied all powers of penetration. Ted, helping in the streets with the wounded, guessed it had dropped down to the impenetrable laboratory where it was just as un-

* Madge Cromwell's ship apparently was using an energy shell, generated from the atomic power of copper and radiated into a perfect shield at 500 ft. radius, keeping the plane protected with a force a thousand times stronger than steel itself—a mesh of repulsive energy that no possible form of matter or explosion could penetrate.

The beam would seem to be a ramification of the same thing—an intratomic wave, concentrated down an electromagnetic beam and utterly shattering molecular structure by shifting entire atoms out of their orbits.—Author.

touchable as in the air, surrounded by an area of force.

He resolved more than ever to keep himself out of the trouble. If he revealed the site of the laboratory he would probably be suspected as an accessory—and anyway the world knew where Asa Cromwell had lived and would invade the spot soon enough.

By midnight, America was declared to be at war. All war measures were put into force—nor was America alone. The inhuman nature of the attack had aroused the ire of other nations. Great Britain offered her immediate aid—her Colonies, Canada in particular, marched into action. Europe arose, too, ready to strike down the invader before any attack could be made. It seemed that in the space of twelve hours the whole world turned upside down . . . but that was only the beginning.

Ted was one of the first to join up, though he pretty well knew the futility of it. Madge Cromwell struck for increasingly long periods in the days that followed, swept back and forth across America. One by one cities were reduced to shambles of ruin and flame. Chicago, Pittsburgh, Philadelphia, Los Angeles, Columbus—one after the other they smashed down under the violet beam. Hundreds upon hundreds of planes, incalculable numbers of bullets and shells were rained through the skies—with no more effect than flirting peas at an elephant. The Black Empress, as Madge Cromwell had come to be known, was indestructible.

In two weeks of absolutely unchecked ferocity she had destroyed nearly all the civilization of America. Then she was not seen for weeks on end, but there came news of destruction of London, Berlin, Leningrad, Stockholm, Paris and Sydney; all over the world she had the upper hand. Nowhere else was there anybody who understood the dev-

astating power of unleashed atomic force: even if there was there was no time to invent a counter weapon. Suddenness and ruthlessness were the perfect weapons of victory.

Slowly but surely the morale of the defenders and harassed people began to weaken. In America, countless thousands trekked over the shattered country to the open deserts of Arizona, there to camp in signification of their willingness to obey the merciless destroyer.

In other countries various places were assigned by Madge Cromwell for volunteer followers of her rule—and little by little she had her way. Her very invulnerability gave her the victory. In six weeks she had won.

Ted Melton was one of those who fought to the last with an anti-aircraft squad in shattered New York. Bemused and bewildered, utterly exhausted from long hours of struggle without any sign of proper morale, he could hardly believe it when he realized that the short, one-sided war was over—that the girl he had loved was mistress of the situation.

He wanted to rise from the litter of dust and shattered bodies to curse the very skies, rain blasphemies on the Creator that had ever permitted her to be born. Millions of innocent lives destroyed—to please one woman with an ambition to rule the Earth. And would that alone suffice?

Ted sighed, moved out of the hot, festering hole where he had nursed the gun, joined others in their tin hats from under which leered grim, dirty faces.

"Heard the news?" asked one of them, briefly.

"That the woman's won? Yeah," Ted acknowledged bitterly.

"That isn't all," the man said, glaring around him in the twilight. "We've got to stop around this muckheap of a city until we're picked up. We're to be de-

tailed or somethin'. I guess the Black Empress is going to give her favors to them yellow bellies who went to Arizona—those who were so darned afraid of her they gave up fighting. Hell!" The man spat thickly to illustrate his venom. "Blast her very name!" he finished acridly.

CHAPTER IV

Two Years Later

TED MELTON became one of a roving band of people, finding food where he could, sleeping where he could, a hungry and embittered being hating everybody and everything.

He had not so much hatred for Madge Cromwell now; more a kind of numbness when he thought of her and saw on every hand the sufferings she had caused. Again and again he cursed himself as a yellow coward for not having killed her that night when he'd had the chance. He could have risked her automatic.

But it was no use now. Two years had passed. Nothing to do but drag on, endlessly, he knew not where, through a land where happiness and progress had gone. He presumed the rest of the world was the same.

He wandered onwards through another chilly Fall, braved the blizzards of a third winter in a small camp. Men and women were persistently with him, their faces set and baggard, filled with frozen hate. Some of the fiercer spirits slew every woman they came across because of her very sex. Along the waysides dead women, horribly mutilated, were by no means uncommon. The name of Madge Cromwell, the Black Empress, was spurned and reviled to the ends of the earth.

Bearded, keeping to himself as much as he could, Ted was just a wandering nonentity. Until one day in the early

summer of the following year, when wandering through uncultured fields near former Chicago, he and his colleagues came face to face with a band of uniformed guards—tall, powerful men, armed with objects that looked like glorified lead pencils. In this resemblance their harmlessness ended. They projected a beam identical, on a small scale, to the one with which Madge Cromwell had mastered the earth.

The sullen party waited as the men came up. In silence Ted studied the insignia on their sleeves, together with the two letters—B. E. Black Empress, presumably. He smiled a little twistedly.

"Names!" snapped the leader of the party, and wrote them down as they were given. He cast pale blue eyes over the tattered group, gave a sharp order and had them bundled into a waiting truck.

Ted was not particularly concerned where he went. In any case view was limited to a small barred window. Ever and again the truck stopped and picked up more fugitives, then rumbled on. It seemed to travel forever across tangled countryside. No halts, no food or water, onward into the night with the women and children crying softly and the men muttering oaths in their beards. Endless miles it seemed.

Ted found himself dozing—was next awakened in the cold light of dawn by a rough hand pulling his shoulder. Stupidly he fell outside and shivered in the cool wind.

"Where—where are we?" he mumbled, staring round on the towering buildings.

The uniformed guard grinned a little mirthlessly. "It's New York. Not the one that used to be here—the new one. See that over there"—he pointed to a slender tower rising over all the

other buildings; "that's *her* rhode."

"The Black Empress?" Ted asked dully, staring at the dawn light smiting its topmost heights.

"Yeah. She's ruler of the world now, you know. She's gotten machines in that tower as tough as those she conquered us with. I don't like her any more than you do, only I slid into a good job as a guard so I'm not grumbling. Besides, what's the use of arguing with a death ray? I guess you'll be one of the workers—like those that built the city. All different now, you know. We're rounding up the outsiders in the countryside—all over the world in fact. Getting things shipshape again. Now let's go, folks."

He turned, followed by the people, while in the rear the other guards came up silently. Pawns, all of them—captors and captured.

THE morning passed within an enormous building with heavily barred windows, evidently the prison. Ted and numberless other fugitives were fed and allowed to wash—then in mid-afternoon he was taken with the others to the girl's headquarters, taken up to the lofty top floor in the elevator and ushered into a room that blazed with lights.

It reminded him of a criminal scanning room of the old days. Guards were everywhere. Against the lighted wall height-lines were drawn. An automatic measuring machine made an absolute check of each person's size as they filed into the glare, stood silent, and waited while a calm, measured voice pronounced exactly what duty they were to fulfil.

Ted listened to the voice in grim silence—it was Madge's. He'd know it anywhere, save that its soft sweetness was entirely absent. It was the all conquering voice of a world ruler.

He listened to the monotonous detailing of instructions, gathered that the girl could see everything that was going on from an adjoining room. Some of the assignments she gave rather puzzled him. Underground workers? Extraction Plants? Blast cannon units? They made no sense to him.

Then it came his turn. Along with the others his name was read out. Immediately the voice ordered him to stand aside. He waited under guard until every other person had been assigned a task, then he was touched on the shoulder and led into an adjoining room—a vast office, wide and imposing, severely but sensibly furnished and backed with a great window which commanded an entire view of the new and still embryonic New York City.

His gaze passed over the steel doors that presumably hid the devilish machinery chambers, to the great desk studded with various buttons, and so to the slim still girlish figure standing by the desk itself. The streaming sunshine caught the soft curves of her figure, the raven black of her hair.

"Come in, Ted." Her voice was like finely tempered steel. He came forward slowly, staring at her with somber, smoldering eyes. A slow, cruel smile curved her fine lips, made her teeth shine in the flood of light.

"Rather a long interval between meetings, isn't it?" she asked lightly, straightening up. "But you see, I kept my word. I have conquered the world."

"I know." Ted's voice was low, dispassionate. "And what's it gotten you? What man, woman or child is there in the world who doesn't hate you? God, Madge, if I'd ever even thought— The things you have to answer for!" he finished in awed horror.

"Sentiment," she said slowly, "never did mix with science. I learned that when I decided to use father's inven-

tions. It was quite exciting while it lasted—particularly as I was, and still am, invulnerable."

"You can destroy life as heartlessly as *that*?" Ted whispered. "It's—it's *that* a game?"

Her shoulders shrugged; she was still smiling unconcernedly.

"Absolute power brings freedom of thought, Ted," she observed. "I know I'm the Empress and now I'm going to put certain plans into effect. Control of the world is not enough; I intend to go further—conquer space. I believe I can from what dad told me."

Ted stepped forward to directly face her. "In God's name, Madge, what is the matter with you?" he panted. "Am I mad, or are you? Is all this some terrible dream from which I'll awake to find the old, lovable Madge I wanted to marry, or does it mean that you are the greatest murderess in earth's history?"

"In the process of advancement from the grosser forms of existence millions are bound to die," she answered thoughtfully. "I gave everybody the chance of obeying me. Those that refused deserved to die."

"There's nothing too terrible for your punishment," Ted whispered, staring at her dark, level eyes. "Nothing!"

She laughed cynically. "I have heard various suggestions for my disposal—strangling, crucifixion, burning at the stake. All of which is very amusing because I hold the master key. I *can't* be beaten."

"Until I'm dead, Madge, I'll never rest until you *are* beaten! I'll dedicate my life to it—to your destruction instead of to our happiness. I'll get you one day, even if I have to come crawling back from the grave to do it!"

"Melodrama—and cheap melodrama too!" she flared at him, her slender body taut in sudden fury. "You driv-

eling fool, Ted! What chance do you stand? Why do you think I brought you in here? To beg your forgiveness? Oh, no! Our association ended way back in Trenton. I brought you here to have a fresh look at you and to show you that I've kept my promise to rule the world. Also, I shall assign you to work."

She paused and considered. "Maybe you heard some of the other assignments?"

"Extraction Plants? Blast cannons? Yes, I heard them," he assented grimly. "I didn't get their meaning, all the same."

"You will, some day." She smiled twistedly. "In the meantime, it might be a good idea to have you work in one of the cannon shafts. No—no, a better plan! In one of the Extraction Plants! It's a nice hard job, connected with extraction of chlorophyll from vegetation."

Ted stared. "Chlorophyll?" he echoed. "What the devil do you want that for?"

"That's my business!" she retorted. She turned and pressed a desk button; a uniformed guard came in and saluted.

"Detail Five!" she snapped. "Extraction Plant. That's all."

The man saluted again and Ted found his arm seized. The girl's cynical eyes followed him as he left the room; they were the last vision he had of her as the door closed— Or at least almost the last vision. As he waited in the hall while other men and women were gathered together he caught sight of the girl again, half an hour later, in the private elevator.

He stared frozenly across at her as she looked at him through the little glass window. Then to his amazement he saw her dark eyes fill suddenly with tears; her lower lip quivered—

—Then the elevator rose upwards and carried her out of sight.

Tears? After all she had said and done to him? Ted began to believe he really *was* mad, that the things that were happening were part of a delirium.

CHAPTER V

Justin Cavil—Scientist

THE site of the Extraction Plant, covering several square miles, was situated on what had formerly been New York's East side. Now all traces of the old had been removed—instead, fronting all along the new harbors and docks, were numberless roofs of the same height, quickly constructed and rather shoddy buildings, laid out with a certain coldly methodical efficiency.

It reminded Ted, as they approached the site in the truck, of a vast group of barracks or a tremendous penitentiary.

"Guess you're right at that," agreed one of his fellow prisoners. "The actual Extraction Plant is a mile northward; these buildings are where the workers live. Charming, isn't it?" His lip curled bitterly. "Absolute freedom so far as it goes, yet if we set foot beyond the boundary of this little colony we'll be shot down."

The man relapsed into silence and Ted kept himself company with his own thoughts until he finally tumbled from the truck and was allotted Billet 7 in the colony. The place was not so bad—there was every needful convenience on a small scale. Except for the grim suggestion of prison life he had no particular kick.

He and his colleagues were divided up, given the rest of the day to accustom themselves to the new surroundings and were warned to stand by for work on the morrow.

Just after nightfall Ted was surprised to see his billet door open and an elderly

man in overalls came in. As he took off his hat he revealed a mass of white hair and lofty brow. Coming forward, the swinging light revealed dark, deep set eyes and a pouting but determined mouth.

"Hallo!" he exclaimed cordially, extending his hand. "I'm Justin Cavil. I guess you're my new billet mate, eh? They told me to expect somebody today. Glad to know you."

Ted shook hands warmly, frowned a little. "Did—did you say Justin Cavil?"

"That's right." The man's eyes twinkled. "Any objections?"

"None at all, only the name's familiar. Wish I could think where I've heard it before."

Cavil shrugged and began to lay the table from the cupboard's modest offerings.

"Extraction Plant?" he asked off-handedly.

"Yeah—start tomorrow."

"I'm there too. I'm a machine minder—except in my spare time, when I do other things."

"Such as?"

Cavil merely smiled, went on preparing the meal, maintained silence until he had the coffee to his liking. Then he sat down at the table and looked across at Ted with his serious eyes.

"Before all this happened I was a scientist," he said slowly. "Maybe that's where you heard the name. I was a great rival of Asa Cromwell, the father of this witch who calls herself the Black Empress."

Ted started suddenly. "Good Lord, yes; I remember now! You laughed at Cromwell because he couldn't find a way to break down the Pottstown meteor?"

"Yes, I guess that's right," the scientist chuckled. "It was all in good part, though. I tell you straight, Asa Crom-

well was the cleverest scientist that ever lived, only he received more acknowledgement than I because he always got his inventions finished before me. There was nothing he created but what I created too. I have the secret of atomic power. In fact I have gone one better. I have machinery which can operate through the lower waves of matter vibration. That means a force infinitely more devastating than sub-atomic energy."

"Then—then why—?" Ted started to ask, but the old man waved him into silence.

"Why didn't I stop Madge Cromwell conquering the world?" he asked quietly. "For the simple reason that my ideas were all on paper and not in fact. There wasn't the time. But there is now!" His deep set eyes were gleaming. "Little by little, with wires and machinery taken from the metal shops at the Extraction Plant, I am building up several machines that will defeat all the stuff Madge Cromwell has in that tower of hers. I'm saying nothing, exciting no suspicions—but I guess I'm pretty well obliged to take you into my confidence. You'd get suspicious otherwise. Not that I doubt there's a single worker would gladly help me to defeat this she devil."

"You can count on me," Ted growled, clenching his fists.

He sat for a time in deep thought, sipping the coffee the scientist pushed towards him, then he asked slowly, "What exactly is the idea of these Extraction Plants, anyhow? What's the chlorophyll for?"

Cavil shrugged. "As yet I don't know, but I'm making plenty of guesses. All over the country where there is wood and forest land—and that includes Canada—pumping plants are being set up. At least five thousand of them are already in action. The plants

drain vegetation of all its chlorophyll, which is in turn carried by pipe line to the various Extraction Plants, this one in New York here being one of a chain. In the Extraction Plants the chlorophyll is repurified absolutely one hundred per cent pure; then it is passed on to another chain of factories in the open country which seal it into cylinders above four feet long and one wide.

"These go into tremendous shafts resembling cannons and are fired by the hundreds into space. Atomic force is the explosive and remote control radio from the tower guides them. And then—" Cavil shrugged. "Frankly, I don't know. I haven't found out yet where they *do* go, but it's obviously somewhere in space. Since the Empress does the remote control herself from a master switchboard in the tower it is not possible to learn anything from anybody. But I'll find out if it takes me a lifetime."

Ted wrinkled his brow. "Say, I'm not much of a scientist," he muttered, "but it does seem to me that the constant draining of chlorophyll from vegetation will deprive it of its essential use. It will affect our atmosphere if too much of it goes on. After all, any school kid knows that chlorophyll is responsible for getting rid of all toxic compounds—carbon dioxide, and so forth."

"Exactly," the scientist agreed grimly. "That is why I have to hurry—work as often as I can. For some reason this devilish woman is slowly bringing about the end of the very world she has conquered. Why? That is the mystery—which in time I will solve."

"I can't understand it," Ted muttered. "To think Madge Cromwell could turn into such a fiend . . ."

"That gets me too," Cavil admitted reflectively. "When I met her and her father at the site of the meteor I was impressed by her great charm of manner.

Strange indeed. Am I to understand that you know her as well?"

"I did. We were to be married, before all this."

Cavil's keen little eyes narrowed a little. "I wonder if you'd mind telling me everything?"

"Sure!" Briefly Ted outlined the general circumstances as they had happened to him, wound up with a deep sigh. "And I guess that's how it is!"

Cavil shrugged. "I'm sorry . . ." he said quietly. Then he got actively to his feet. "Well, I've work to get done. Maybe you'd like to see my laboratory?"

"Laboratory!" Ted gasped in wonderment. "Where?"

"Underground—about half a mile from where the old Museum of Natural History used to be. I believe my place was originally the basement of a multiple store. Plenty of them left after the war, you know, but very few discovered. I found mine by accident. Its roof is twenty feet below ground level. Plenty of other advantages about it, too. Come along and I'll show you."

They went out together into the dull lit regions of the workers' quarters. At the back of the little domiciles, rearing invincibly into the night sky, was the new New York, dominated by the girl's highest tower of all. Ted glanced up at it as he went slowly along, pondered its countless windows and the beacon at the extreme summit, wondered what new plans the girl was evolving.

Cavil gripped his arm.

"Down there," the scientist said, glancing swiftly around—then assured that the other workers wandering about the settlement were too far away to be suspicious, he raised a grating, dropped down into the cavity beneath. In a moment Ted was beside him, closing the grid gently. He felt around on a dry, circular wall.

"Old sewer pipe," Cavil explained. "Hang onto me."

Ted obeyed, wandered he knew not where through the low built pipe.

Then at length Cavil fumbled in his overalls for keys and undid a heavy wooden door, stepped forward and switched on a small electric light. Ted gazed in amazement on a passably well equipped laboratory, the roof supported by heavy, crudely fixed beams for additional security.

"My hideout," the old scientist grinned. "Come right in."

He closed and locked the door.

"Bit of a come-down for a once world famous scientist," he observed, musing. "Still, no matter; those days will come back. We're safe here too."

He pointed to a door in the wall facing the entrance. "Beyond that door is a tunnel half a mile long, made by me," he said impressively. "I've dug it—little by little. And why? Because, exactly a mile and a half away from here is the Empress' tower, in a directly straight line. The map I have proves it. So you see, finally I shall reach the foundations of the tower. No other buildings will get in the way because the tunnel follows deep under the main road leading to the central square where the tower is situated—"

"Good Lord, if it were possible to get inside the tower—!" Ted broke in breathlessly.

"We might learn plenty," Cavil commented. "That will take time though—and I have so little time to spare. Nevertheless, it will be well worth the struggle. And here"—he swung round—"are my tools and apparatus."

He tapped various efficient though roughly designed machines affectionately, stooped and mused before a device resembling a radiotelevizor.

"This may interest you," he remarked, looking up. "Just think of

something, will you? Anything will do."

Ted nodded and thought rather bitterly of Madge. A switch on the machine clicked under the scientist's hand—then Ted stared in surprise as the screen of the apparatus gave a perfect picture of Madge just as he had envisioned her.

"What in hell—" he began in amazement, and with a chuckle Cavil switched the instrument off.

"Thought reader,"* he smiled. "I've only had it finished a couple of days."

"If only we could get the apparatus near Madge!" Ted cried. "Think of it! Her every thought revealed—"

"I know . . ." Cavil frowned. "I'm working on that problem right now. The apparatus needs increasing in range: once I can do that I can reach her thoughts from this very spot. Trouble is, the whole apparatus is too heavy to move about, otherwise I could shorten the range a good deal by taking it down the tunnel."

He turned aside to a half assembled device of copper wire wound round drums, connected in turn to crystalline bars, insulation blocks, and glass tubes.

"The energy machine I told you about," he explained. "Three times more powerful than the Empress' device. You may be aware that her instruments generate a shield of energy which sets molecules in vibration so that no ordinary power can break through them? Well, this is far more efficient. A shield generated from this

energy could break down one of hers! Also you know that her beam works by shifting atoms out of their positions and causing disintegration? I can do better!

"My force causes molecules to polarize to any desired degree. Each molecule is, as you may know, a tiny magnet with north and south poles. When the beam wave from this machine is generated it forces molecules to swing exactly as I wish.

"See the possibilities? I can either create matter so tough and compressed that nothing can shatter it, or else I can so alter and coordinate its molecules as to destroy all its original form and eliminate friction and cohesion. Result is total collapse of the matter concerned and its transformation into energy. That definitely goes one better than the Empress' subatomic device which merely displaces, but does not destroy matter."

The silence of speculation fell on them for a moment, then again Cavil became active. Opening a cupboard he produced picks and shovels, opened the heavy door and led the way with flashlight into the tunnel. Ted, pick and shovel under his arm, followed behind until they arrived at the rocky earth barring their path.

"Incidentally," Ted remarked, as Cavil put the lamp down, "where do you put the earth you dig out?"

"I wait until I have a good quantity then transport it back into the laboratory. After that it's a simple matter to carry it to one of the several disused sewer areas branching off the main one leading to the lab. Slow work, but it can't be helped. Once I've finished my energy machine the thing will be easy. The barrier will simply be converted into energy. Now, let's start. We've wasted enough time talking."

Ted nodded, tugged off his coat.

* Science now says all thoughts are electrical, produce tiny impulses. A machine such as Cavil has invented, incorporating the basic ideas of radio for its principles to pick up thoughts is not impossible. An amplifier could increase their minute power; a transformer convert them into visible images of light. The whole nature of thought is based on what we observe by reflection of light rays. By that very fact translation back into light waves should not be so difficult.—Ed.

Suddenly, life was worth living again. He was working for a purpose—the unravelling of the mystery that clouded his whole existence, the mystery of why one girl had sacrificed her entire soul and decency on an altar of world power.

Savagely he dug his pick into the mass—again and again, watched powdered stone and rubbish fly in all directions.

"Not too fiercely!" Cavil warned him. "Though we're not likely to be heard we can't afford to take any chances."

Suddenly Ted gave a yelp as his pick rebounded with stinging force from something of almost incredible hardness. He nursed his palms and glared down at the rock, seized the flashlight and held it closer.

"Metal!" he ejaculated in surprise. "And that wallop I gave it hasn't even scratched it. If this goes for any distance we're going to have a swell time breaking through it."

He seized his pick again, hammered away the rock from around the small section of metal he had struck. Yet in every direction he and Cavil worked they struck more metal—until it became depressingly evident that the passage was blocked from side to side with a veritable wall of the stuff.

"Damn!" Cavil breathed fervently. "We must have struck the foundations of some old building."

He frowned, went on his knees and studied the metal closely, hammered his pick point against it. Not even a scratch resulted.

"Looks as if we'll have to detour somehow," he grunted; then for a long time he was silent, presently looked up. "I guess I don't know what sort of metal this is. It's tougher than either iron or steel—"

"Say!" Ted breathed, snapping his fingers suddenly.

"Well?" Cavil's white head jerked round. "What's wrong?"

"I've just thought of something. Just whereabouts are we at the moment? I mean in relation to old New York?"

Cavil tugged a soiled map out of his pocket and studied the penciled lines that indicated his tunnel. After some study he said:

"About three feet or so from the site of the old Museum of Natural History, shelled to pieces during the war. Why?"

"It's a cinch!" Ted breathed, his eyes gleaming. "Remember that meteorite you visited at Pottstown?"

"Naturally. What about it?"

"It was removed to the Museum," Ted went on eagerly. "What would happen during a bombardment? The thing was so tough nothing could make an impression on it; a million to one it would sink down through the shattered floor and become buried in debris. I'll stake my whole life on the fact that this darned metal here is that meteorite itself—unbreakable, unsmashable. If I'm right we'll never get through it, unless of course we make a detour."

"You are right, must be," Cavil answered slowly, thinking. "The coincidence is too obvious to be missed. But I don't altogether agree that it means a detour. My energy projector will go through it; no matter ever created can stop it—"

He looked up with keen eyes. "That's our next course, Ted. Finish the projector before anything else—then we'll blast through the tunnel and this stuff as well—right onwards to the tower. Now let's get back to the lab."

They turned and headed back up the tunnel. Once more in the laboratory they plunged into a frenzy of activity on the half finished projector. Ted, knowing nothing of the workings, could

only do as the scientist ordered, and he found the work fascinating enough. Hour by hour they worked on.

The small hours had arrived before they sneaked back from their underground hideout to the billet to secure a much needed sleep.

CHAPTER VI

A Tremendous Discovery

THE following day Ted received his first initiation into the grueling labor of machine minder in the Extraction Plant. He spent twelve grinding hours—excepting for meal intervals—before a whirring, complex machine.

In the great throbbing hall of industry he saw the transparent tubes which brought the pumped chlorophyll from the vegetated areas of the country, saw the alcohol compression machines by which the chlorophyll was refined to deep green solution and run off into vats traveling on an endless conveyor belt—thence to parts unknown, presumably for sealing in the cylinders.

The whole setup fascinated him by its very mystery. The testing chambers, too, were masterpieces of efficiency, wherein robot control tested the spectrum of the refined chlorophyll, its purity being decided by its absorption bands in the red and orange regions.

Strange, Ted reflected, that the girl should have such far reaching knowledge. Everything on every hand bespoke a brain of a power which, to be absolutely truthful, he had never thought the girl had possessed.

How many thousands of gallons of chlorophyll passed through his own particular machine unit during the day he could not imagine; it all left him with the grim fear that this was driving Nature too far. The stuff was patently being extracted far faster than it could ever be replaced, hastening on all too

obvious doom of the earth itself. And yet why? What had Madge Cromwell to gain by ruining the very world she had conquered? That was where the mystery lay.

In the evening Ted forgot most of his fears in returning to the underground laboratory with Cavil.

But they worked for several weeks, a little at a time, before the old scientist was finally satisfied—weeks in which the flow of chlorophyll had gone on, weeks in which Ted had seen, on one occasion, some five hundred tightly sealed cylinders, with detonators on their ends, fired into space from a solitary cannon pit just outside New York. Whither the cylinders went upon leaving the earth nobody knew—except Madge Cromwell. That very thought made his urge to finish the tower tunnel all the mightier.

And now Cavil had the instrument finished, fingered its queer outlines gently. He surveyed the neat storage batteries attached to it, by which means, so long as the charge lasted, it was entirely portable and self-contained.

"Now to see what happens!" he said anxiously. "I've fixed a resistance so the strength can be built up gradually. Also I have incorporated a shutter to narrow the width of the beam."

Picking the instrument up in his arms he led the way into the tunnel, set the machine down a couple of feet from the metal barrier.

Ted held the torch, watched as the scientist carefully moved his switches. Instantly a hardly visible pencil of deep red light sprang from the projecting lens of the apparatus, struck clean in the center of the metal and rock crusted wall.

The result was amazing. The encompassed point flowed and dissolved within itself, soundlessly but inevitably. A

weird streaming flux grew larger and larger as matter everywhere in that circumscribed area ceased to be, changed itself into energy that made the skin of the two men tingle and set their hair nearly standing on end. Their eyes smarted with invisible radiations. The whole atmosphere around them was suddenly alive with static forces.

"Better wear these," Cavil said briefly, and tugged specially made goggles out of his pocket, handed a pair to Ted. Then, the strain on their eyes relieved, they returned to watch that flaming core of power.

Within minutes, or so it seemed, the beam had sunk clean through the barrier.

"Then it *is* hollow," Cavil murmured. "I suspected it. Its weight on being removed to the museum was entirely disproportionate to its size, and such dense metal too."

He shifted the projector a little, cut a flowing, sweeping circle and finally had an opening large enough to permit entrance. Then he stopped the power and taking the torch he began to scramble through the hole he had made. Ted followed after him, discovered that the meteor was indeed hollow, with a wall two feet thick. Two feet of unscratchable metal vaporized in twenty minutes! It enlisted within him a new respect for Cavil's genius.

To his surprise, on emerging from the hole he discovered not an empty hole with a wall beyond it—but a small area of machinery hemmed in by smooth, curved walls! In the center of this stood Cavil, gazing round in bewilderment on multiple switches, charts, a chair bolted to the metal floor, reflecting prisms.

He wheeled suddenly, crossed over to a barely perceptible line in the smooth metal which indicated a door. Silently he studied it.

"Good—Heavens!" he breathed incredulously. "Ted, do you realize what this meteor is? It's a space machine, composed of immensely tough metal to stand the impact of atmospheric friction and the meteors and brickbats of empty space. Look around you! What is more, this door is so devised that it opens only by a combination lock, either from inside or outside."

"But—but where the devil did it come from?" Ted demanded, gazing round. "And if it comes to that, why?"

"I don't know—yet," Cavil was so eager he had become impatient. He went round the small space like a bloodhound, staring at the machinery, probing his torch beam into every corner, peering at the controls. Ted nosed around too, but found little to explain the mystery. Then suddenly Cavil called him.

"Take a look at this chart!"

Ted obeyed, but to his unastronomical mind it conveyed little—was composed of lines, both straight and wavy ones, drawn from one circle to another, with several other circles of varying sizes lying in different directions.

"I don't get it," he frowned. "Maybe I'm dumb—"

"Definitely!" Cavil growled. He jabbed his finger on the chart. "This big central circle is the sun. Now, these lines here are drawn from the first planet next the sun—obviously by somebody with an extremely good knowledge of space drifts, fields, and so forth. In other words, a first class interstellar scientist. All the lines converge on one point—the third circle from the sun. That's Earth, of course."

"You—you mean this thing came from Mercury?" Ted gasped blankly.

"The thing's obvious—but don't ask me the reason it happened. Somebody drove it here! The only explanation I can think of is that the person or being

remained inside here until this 'meteor' was taken to the Museum. Then simply walked out."

"But the person from Mercury," Ted persisted. "What happened to him? Damn it all, any kid knows that no two beings of different worlds can be exactly alike. A Mercutian would be instantly discovered."

"Yes, I suppose so." Caviil stood in deep thought for several minutes, then he said, "That part puzzles me plenty. We do know that a Mercutian is somewhere on Earth—and that ever since this meteor fell strange things have been happening, in which Madge Cromwell, daughter of the world's former greatest scientist, is deeply involved. Where exactly does she fit into the puzzle?"

"Suppose," said Ted slowly, "that the Mercutian is in hiding—or even can make himself invisible—and is hypnotizing Madge for his own purposes? That she isn't the master of her own will?"

Caviil looked at Ted thoughtfully. "Have you seen her face to face since she became Empress?"

"Sure."

"So have I—and did she strike you as being hypnotized? No, Ted. I never saw a girl so completely in possession of her faculties. That's the problem. The only way to really discover is by my mind reader."

Caviil paused and surveyed Ted steadily.

"Listen, Ted," he said quietly, "this new revelation puts a very different face on things. We're fighting the ingenuity of people of another world. For some reason they are deliberately stealing chlorophyll from Earth. Whether or not the chlorophyll is fired to Mercury we don't know—but Madge Cromwell's mind will tell us. We've got to work fast from now on, stop this dangerous scheme before it gets any further. We'll

have to divide our labors. You continue digging the tunnel by means of the projector, blast out the other side of this space meteor and go forward through the tunnel's continuation. For my part I'll bend all my energies to enlarging the range of my thought reader. Can't bring it down here, unfortunately; it's a fixture. That's our next course. Now you carry on; I'm going back to the laboratory."

AND from that moment they started on their divergent paths, working night after night. During the ordinary day work they heard the first alarming reports from different parts of the world concerning the effect of the chlorophyll draining.

Two things were happening. Vegetation of course died with its essential constituent removed—or else became a weakly, faded version of its natural self. This very fact, in America and England at least, was producing disastrous effects on the staple food trade. Animals were running short of food; frantic bargaining had begun; prices were soaring. But the relentless extraction of chlorophyll went on and all deputations to Madge Cromwell to stop this slow killing of a world were met with flat refusals.

There was a bigger, graver danger, too. The atmosphere was slowly becoming vitiated. It would be many months, even perhaps some years, before it became rankly poisonous—but definitely such a thing would come to pass if matters went unchecked. The essential task of chlorophyll to break down carbon dioxide and release oxygen under the stimulus of sunlight was being gradually stopped. In the end it could only mean that the air itself would get overburdened with a preponderance of toxic air, and the consequent asphyxiation of all living things.

Yet mankind dared not rebel. So far as humanity knew, the woman in the tower still held the whip hand. Week after week the work went on; week after week the endless numbers of chlorophyll filled cylinders were fired into space.

And down in the underground laboratory Justin Cavil and Ted worked on-wards with steady persistency. Ted in fact had driven the tunnel to within a few feet of the foundation walls of the tower. There he stopped, afraid to venture further without the scientist's further instructions—but as yet Cavil was too busy otherwise to give the matter his attention.

His whole being was absorbed in the task of putting the finishing touches to a range-widening device for his mind-reader, a feat which he finally accomplished by stepping up the power and consequent area of reception. So, little by little, using a little more power each time, incorporating fresh turns on his coils, removing others, he achieved the necessary balance, found the exact area in space in which the girl herself invariably moved—the controlling office of the tower.

For three nights the two men labored to bring her thoughts to their screen, but failed owing to her absence from headquarters. On the fourth night, however, there was a change. Images began to come through, crowded onto the screen.

Both men sat in breathless tensi-ty, watching the swirling visions forming before them.

It was a vision of machinery, which just as quickly merged into a clear cut cameo of a hideous looking object not unlike a mammoth scorpion, its gigantic eyes staring with horrible intensity into a massive drumlike object banked with tubes.

"A—a Mercurian?" suggested Ted,

horrified, and Cavil nodded slowly.

"Possibly. Evidently the Empress is thinking about Mercury."

"But how can she?" Ted demanded, bewildered. "She's never been there; doesn't know anything about it. Unless it's really hypnotism. In which case she would only see what the mind in control wishes her to see."

"Actually it definitely disproves hypnotism," Cavil answered slowly. "If it were hypnotism this machine would not work because it is attuned to *her* brain, not to the emanations of the brain in control. There'd be just a blank. No, these are her actual thoughts, but how she— Look!" he finished quickly.

The view had changed now, was encompassing a vision of New York. With the natural rapidity of thought itself, as the impressions drifted through the girl's keen brain—whether actual observations or merely memory impressions—the views dissolved into one another and had real sense and continuity only to their owner.

With surprising swiftness New York dissolved into a cannon pit, from which vomited countless hundreds of chlorophyll shells. A momentary glimpse of infinite space, then a fetid, steamy wilderness drifted into view, in which no thing stirred as yet, but where the slow moving, steamy seas were smothered in monstrous green splotches. There was a series of explosions, which could only mean the arrival of a number of chlorophyll shells.

"Great Heavens, it's Venus!" gasped Cavil, turning an amazed face to stare at Ted. "It can't be anywhere else! The outer planets are too far away to be reached by cannon, even with atomic force. Mars is dead, Mercury is frozen one side and scorched on the other. That leaves only Venus. The Mercurians, then, must live inside their world. What the devil does it all mean, I won-

der? Hallo, what's this?"

The scene was not very startling, merely back to New York again and the headquarters office itself—but now it had come to actual perception—instead of what had clearly been either memory or imagination—there was something odd about the picture. It was blurred, split up in the queerest fashion; actually some kind of superimposition with one view overlying the other.

As far as the straining men could make out, a laboratory was overlying the view of an old man, and the old man was the dead Asa Cromwell himself, staring dumbfoundly in front of him—Then the scene swamped itself with a picture of New York. It broke up into weird double sections—New York, Ted himself, Asa Cromwell, hurtling meteor, Mercury, Venus—all interwoven in a mad complex.

"This is impossible!" gasped Cavil amazedly. "No mind, however great, can think of two things at one and the same time. And yet here we have it. It must be *her* brain because no other could be identical. That means—"

"Wait!" Ted cried, leaping up wildly. "Wait a minute! I believe I've got it! Anyway, it's worth risking. Madge is in the tower now and the rest of the place will be pretty well deserted for the night. We're going to blast the remaining few feet of tunnel and get inside—It's a cinch to catch her alone. Even if we don't that energy gun will take care of everything. Now come on."

"But—but why?" Cavil gasped blankly. "We haven't—"

"Don't argue!" Ted yelled. "I've got the solution! Hurry up!"

CHAPTER VII

The Mercutian

IT was only a matter of minutes to gain the remaining barrier in the

tunnel. Ted didn't stop for anything, not even to speak. He went to work with a grim determination that had the old scientist utterly baffled.

He watched in silence as Ted drove the energy pencil into the remaining rock and metal foundations. In less than fifteen minutes he had made a hole large enough to scramble through into the lowest basement of the tower itself.

There was nobody in sight. The torch beam traveled over endless neatly stacked cases, all the paraphernalia of a basement warehouse.

"O. K.," Ted whispered. "We're going up to Madge's office if we have to blast our way there. I'm asking no questions of anybody. If they try to stop us—" and he patted the energy gun apparatus significantly.

Though he could not entirely understand the urgency Cavil cooperated willingly enough. The storeroom door was their first barrier, until the lock vaporized under the gun. Then the path was easier.

By slow degrees they worked their way up the cavernous staircase to the lower floors—the offices, checking rooms, anterooms.

Suddenly a dim form loomed up before them, and behind him another. Guards! Ted swung the energy pencil up and it flicked once, twice. With a moan the first man sank to the floor, acrid flesh odors in the air as smoke rose from his breast. The other staggered, and a moan of intense pain escaped his lips.

Leaping forward, Ted swung a heavy fist against the man's jaw and knocked him unconscious.

"Poor fellow," he muttered. "Had to do it, both to keep him from spreading the alarm, and from suffering the pain of that energy burn. We'll have to come back and take care of him . . . if we succeed in what we are doing."

They went on now, and a few floors further up, shrank against a wall, as another watchman walked slowly past a divergent corridor, unaware of their presence.

Up and up to the topmost floor of all, region of the girl's own dreaded power. A single light glowed on the corridor outside her office.

"Leave all the talking to me," Ted whispered, his face grimly set. Then grasping the door handle of the office he pushed gently. It was not locked. It swung wide, framed him on the threshold.

The great office beyond was mainly in shadow. The main lights were off; a single desk lamp cast a circle of brilliance on Madge Cromwell's dark, shining head—then suddenly it changed to her face as she looked up in surprise at the deeply shadowed form regarding her.

"Who is it?" she demanded shortly. "What do you want?"

Ted eyed her, smiling twistedly. "Lock the door, Cavil," he commanded coldly; then he moved forward slowly until he and the girl were facing each other across the desk. Her face was rigid, hard, her eyes bitter pools of darkness. Abruptly the lights came up as Cavil found the switch, turned the girl's face to a dead white mask.

"So it's you, Ted," she said slowly—then sharply, "What do you want? How did you get in here?"

He still stood staring at her with smoldering, malevolent eyes.

"Well, well, speak!" she hurst out fiercely. "Say something!"

"I will. . . ." His voice was amazingly steady, had in it all the depths of bitterness. He moved forward a little, rested his elbows on the desk and stared the girl full in the eyes. Under his elbows he felt switches grind.

Then suddenly springing into light-

ning he clutched the girl by the throat, heaved, dragged her by main strength clean across the desk and hurled her, sprawling and dazed, to the carpet.

"You devil! You consummate she devil!" he breathed in cold fury. "Of course you showed no mercy! Of course you didn't, damn you, because you had no reason to!"

"Take it easy, Ted," Cavil put in anxiously.

"Easy!" he bellowed. "Good God, man, don't you realize that it's our turn now—? Get up, you!" he roared demoniacally, and suddenly thrusting his hands under the startled girl's armpits he swept her up from the floor, raised her until her alarmed face was within inches of his own. There he held her by main strength, her feet kicking in furious helplessness against his legs.

"Now get this," he whispered. "I know your secret—I know all about you! I'm trying to remember that you're a woman—at least I suppose you are—but so help me, if you don't spill the whole story I'll kill you—little by little, break every bone in your body one by one. It's up to you," he finished significantly, then suddenly lowering to the floor he gave her a shove that sent her reeling into a chair, shaken and dazed.

In a moment his powerful hands had clamped her wrists tightly to the chair arms.

"Well?" he asked sardonically, and there was no mercy in his face.

"I—I don't know what you're talking about!" she panted thickly. "You can't do this to me! I'll—"

"Oh, no, you won't," Ted broke in shortly, and he suddenly transferred his hands to entirely encircle her wrists, began to turn them slowly. The girl's face whitened; her teeth began to dig into her lower lip.

"Remember," he grated out, "I can

do this longer than you can stand it. And I won't let up until you speak. Now, talk!"

He went on twisting slowly and relentlessly until the girl began to squirm under the pain.

"I—I don't know what you mean," she gasped hoarsely. "I'll have you killed for this! I—Ohh!" She broke off with a scream as the grip became more vicious and her shoulder twisted.

"Ted, you can't do this to the girl you really love!" Cavil gasped in horror. "Stop it, you madman—"

"It so happens that this isn't the girl I really love!" Ted replied stonily. "Is it?" he demanded, glaring into the girl's furious, pain ridden face. "*You are not Madge Cromwell!*" he roared. "Admit it, damn you—admit it!"

"What?" gasped Cavil in consternation. "*Not Madge Cromwell—?* But she must be! She—"

"A perfect image of her, but not the real Madge!" Ted ground out. "Confess it—!" He gave the girl's arms a final wrench then disgustedly hurled her out of the chair to the floor. She lay there, rubbing her tortured arms.

"She isn't Madge," Ted repeated, striding round her and glaring down on her. "Your mind reader, Cavil, showed that two minds were on the same wavelength—two brains, identical, thinking different thoughts at the same time. Two editions of the same brain. Two Madge Cromwells! The real Madge is the one who called me on the telephone so long ago, the one I briefly saw in the elevator more recently. Remember me telling you about the ultra violet photo she took of her dead father's retina? The girl in that picture was this Madge here—the one who killed Cromwell. The real Madge thought her father caught a glimpse of her before he died. He did not. The woman he saw was this fiend. Am I

right?" he demanded, glowering down.

"You driveling fool!" the girl on the floor retorted, glaring up. "I tell you I'm Madge Cromwell and you'll suffer for this! I'll have you—"

"Right, you've asked for it!" Ted barked suddenly. "I've no compunction regarding what I do to you. I'll learn the truth even if I have to murder you!"

"Try it!" she retorted defiantly.

For answer he swept her threshing body into his arms, flung her in her office chair and tied her down with his belt. Then, though it went somewhat against the grain, he put into force a devilish routine of third degree. Switching off the main lights he trained the blazing desk light directly on the girl's face, hammered her with questions, used every means of subtle torture he could devise.

An hour crawled by and the stubborn dark head still shook. Another half hour—then at last the terrific strain snapped even her iron reserve. She broke down with a sobbing gasp of exhaustion.

"All right—all right, it's true," she gulped. "I'm not Madge Cromwell. I'm—I'm from the world you call Mercury. I'm a Mercutian, patterned in form exactly like Madge Cromwell.

"My people sent me as their agent. They have studied Earth for years, saw how, without endangering themselves or giving anything away, they could master this world and use its most valuable constituent—chlorophyll—for their own purposes. For the execution of this plan they needed great manpower—more than we have got—and also somebody on Earth with weapons so powerful nobody could stand against them. Our own are too heavy for transport."

The girl paused, gasping heavily from her ordeal.



A sudden explosion and the fizzle of glass

"Their telescopic devices finally discovered Asa Cromwell, and for several years followed his activities, and those of his daughter. The old man was too difficult to duplicate, nor would the reason have been so convincing. Better to use his daughter, who might conceivably be young and foolish enough to get ideas about world power and go crazy with her father's discoveries.

"His daughter was studied by our medical experts, both externally and internally by telescopic X-rays. Her every organ was duplicated, her every scar and mark, down to the last hair on her head. I was the subject, underwent the painful process of repatterning by slow degrees. Months of hell, which made me the image of her.

"So I came to Earth . . ."

The Mercutian woman paused again, tossed damp black hair from her face.

"I came in what you thought was a meteor. When it was put in the Museum I easily escaped. I could talk your language easily because years of study of lip movement has taught my people the syllables peculiar to this country. It was simple on arrival to track down Asa Cromwell in his laboratory. I had only to await a time when his place was free for a while of protective forces, step in as his daughter, and kill him.

"We had a fight when it came to the final issue, knocked over several instruments—then I believe the knowledge of being slain by his own daughter was too much for him—and he died. It saved me the trouble of using more obvious methods."

"Well?" Ted ground out. "What else?"

"Later I went to New York, walked in on Madge Cromwell. I had, of course, kept careful watch over her movements. The hotel had no thoughts other than that I was the same Madge Cromwell

who had signed the register. My clothes were identical, and certainly my face and figure were. So I took Madge Cromwell away in one of her own trunks. Once she broke away and rang you up. I stunned her—but I let you come in order to be rid of you finally and completely."

"Since you killed Asa Cromwell, why not her?" Cavil demanded.

"Is it not obvious?" the woman asked coldly. "When my work is finished on this world I intend to leave her in my place to take the entire blame. In that way nobody will ever know the truth. Though she will tell the story, who will believe? Mercury will always be safe."

"But—but *why* all this elaborate preparation, this perfect cover up?" Ted cried. "I can understand you leaving Madge to take the rap, and thereby leaving yourselves free from any chance of vengeance in the future—but why the struggle anyhow?"

"It's a plain story of necessity," the girl answered. "Our world is practically exhausted in the matter of internal air. Venus is the best possible next planet for us because of its nearness to the sun. In our natural form we thrive on great heat. I of course have sacrificed my birthright for my people. Venus has an atmosphere in which oxygen is absent—therefore as it stands the planet is no use to us. To generate enough oxygen for the whole of Venus would be impossible—hence our idea of using chlorophyll, in which Earth abounds.*

* This plan is amazingly logical. Chlorophyll creates oxygen. The chlorophyll forms starch in the process of photosynthesis, utilizing the energy of sunlight and liberating oxygen in the process. The presence of vast quantities of chlorophyll in both its pure and basic forms—for it is a highly complicated compound—would make vast changes on Venus in a very short space of time. For one thing, certain forms of matter would be enabled to utilize the most potent form of energy—oxidation, and gradually the planet would develop a breathable atmosphere—Ed.

"Before very long, long enough to suit us at least, Venus will become a planet suitable for us. Earth will have died, no doubt, for the amount of chlorophyll we will need, in order to speed up the process as quickly as possible, will drain earth entirely. Not that it matters. The people of Earth are an extremely stupid race at the best. The chlorophyll containers are fired with detonators so that they will explode on landing. Already, even if I were to fail now, my work is done. New life has come to Venus. But I must go on and on.

"Now you know," she finished slowly. "Now you know why I have invented things rather surprising in the matter of machinery—why I linked atomic power to a stolen airplane at the outset of my conquest. Man power was needed and a world rich in chlorophyll. What better world than Earth? A desperate race will take desperate measures— Like me!" she wound up savagely, and her hands which had been hidden in the shadow under the desk suddenly rose up, holding something glittering. A drawer lay open—

Instinctively Ted and Cavil fell to one side, just in time to see a savage beam of energy slice a piece out of the wall nearby. Before they could fully grasp the situation the girl had severed the belt that held her body, leaped to her feet.

"As I said, my plan will go on," she muttered venomously. "Do you think for one moment that I would let you get away with all you now know? Oh—no!" She leveled her gun steadily and the two men looked helplessly towards their distant force gun projector. She smiled icily.

"I'm going to kill you," she explained smoothly. "You have tortured me, forced the truth out of me—but it will do you no good."

She raised the gun a little and Ted waited bitterly for the end, Cavil beside him.

But the end did not come. Instead there was a sudden explosion from the window to the rear of them—a tinkling of glass. The girl looked up in sudden alarm, and in that second red suddenly stained the whiteness of her breast above the heart.

The gun dropped out of her hand, her face contorted. With a little moan she fell back helplessly in her chair, hands pressed to the wound.

Ted had hardly recovered from his surprise before a splintering of further glass arrested his attention. A man vaulted into the room, revolver in hand, leapt swiftly across to the door and unlocked it. It vomited a struggling, shouting mob of people.

"What the devil—" Ted began in bewilderment; then he swung round as the man with the revolver drew from the crowd and came quickly forward.

"Tell you in a minute," he panted. "Look . . . !"

The crowd had halted before the woman in the chair. For a moment her dimmed dark eyes looked across at Ted.

"Per—perhaps it doesn't matter," she said in a low voice. "I've started—started the new world for my people. You—you still have your world." She gave a twisted, sardonic smile. "I shan't need to—to build a space ship to go home after all—"

Her eyes closed slowly; her head dropped forward. For a moment the angry crowd stood silent, then with a roar they swept in on upon her, raised her high over their heads and bore her to the window. With terrific force they hurled her body against the already broken glass, watched it go hurtling down into the yawning dark.

Cold wind blew in from the window. Sobered, the people turned, grim faced

and flushed with vengeful satisfaction.

"You see," said the man with the gun, turning, "we heard her entire confession. I'm one of her night watchmen. Somehow the microphone in this room, connecting with the rest of the building got into contact. Anyhow, there I was down below, marching around, when all of a sudden I started to hear everything going on in here. I called the people in from outside to listen. On every floor the confession could be heard. I couldn't hold them; they were mad with lynch lust.

"We came up here and the door was locked. I went along the parapet to this window and saw what was happening through the chink in the curtains. I'm darned glad it was my hand that finally killed that she-devil from Mercury. My wife and kids died because of her!"

There came growls of assent from the mob. Still others were pressing in from the corridor.

"It must have been my leaning on the desk that livened the mike," Ted panted. "I remember now—I did feel switches under my elbow—Thank Heaven her confession was heard; Madge would never have been believed otherwise. But where is she?" he went on desperately, twirling round. "The woman said something about a basement—"

"Guess I know," one of the men said. "There's a passage near one of the basements that's always kept locked. I've had to guard it without knowing what's been on the other side. Elevator is the only direct contact with it. I was always sent away when the door of the place was opened— But we don't know the combination of the lock," he finished helplessly. "She knew that."

Ted glanced towards the energy projector. "Let's go!" he said curtly.

In five minutes the private elevator

had dropped to the lowest levels, faced a small square of corridor and a heavy steel door.

"Hey, there! Madge!" Ted bawled, but there was no response.

"Guess the door's soundproof," said the man who had been the guard. "I've never heard a sound from inside."

Ted nodded grimly, switched on the projector and burned steadily on the lock. When he had driven a small hole through the door there came a cry from beyond.

"Who's there? What's happening?"

"Madge!" Ted yelled in hysterical delight. "Hang on!"

He burned away again with savage fury until at last the entire lock had vaporized. The crowd pushed the door open. Beyond was a fairly comfortable cell, dimly lit. Madge Cromwell herself, so staggeringly like her dead image

that even Ted was bewildered for a moment, was seated on the bed, a gown thrown hastily around her.

She came forward slowly—then as she spoke Ted's last trace of bafflement went. That same quiet voice, that same sweet expression.

"Oh, Ted . . . Thank God! That awful creature—"

She gulped helplessly, burst into a flood of tears.

"There now, forget it," Ted murmured gently, pillowing her dark head on his shoulder. "It's finished with. She's dead, and you are free. And there'll never be a next time. The world goes on—a changed world—learned a lot by experience and only just escaped its doom. But you're the same old Madge and I'm just the same old Ted, I guess. Eh, Cavil?"

The scientist smiled, said nothing.

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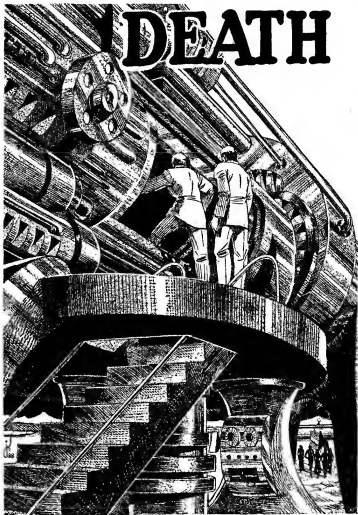
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DEATH



Wendell was trembling as he stepped into the car

in the Tubeway

By STANTON A. COBLENTZ

Even the sacrifice of his happiness meant nothing to James Wendell. His whole life was wrapped up in the Tubeway. Then success hinged on a camera's performance

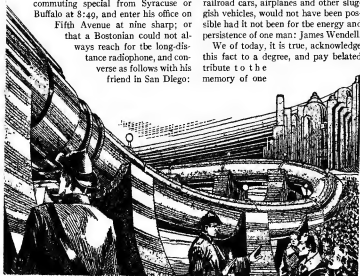
WE fortunate dwellers in the early twenty-first century, who look upon the Tubeways as part of the inevitable and enduring order of things, can scarcely realize that there was a time when these modern essentials did not exist.

Few of us remember that it was not always possible for a man to take the commuting special from Syracuse or Buffalo at 8:49, and enter his office on Fifth Avenue at nine sharp; or that a Bostonian could not always reach for the long-distance radiophone, and converse as follows with his friend in San Diego:

"Hello, Bill. . . . Yes, I'm speaking from home. There's a little matter I'd like to see you about this afternoon. Let's see, it's now noon, by your time. Meet me corner Bush and Market at two."

Such little details of present-day life, which we take as much for granted as did our ancestors their journeys in railroad cars, airplanes and other sluggish vehicles, would not have been possible had it not been for the energy and persistence of one man: James Wendell.

We of today, it is true, acknowledge this fact to a degree, and pay belated tribute to the memory of one



of our supreme inventors; yet the world has never fully understood the great spirit of this man, his devotion to his idea, and the grim battle he waged in the face of desperate odds in order to achieve a triumph that he was never fully to enjoy.

It accordingly remains for the tale to be told by my own humble pen; for I had the privilege of being the one intimate and confidant of that secretive genius; and, although eleven years his junior, was able to follow his life as none other could, by virtue of my services as his laboratory assistant.

Owing to a curious provision of his will, no biography of Wendell, long or short, was to be made public until twenty-five years after his death; and, out of respect for his wishes, I have withheld this record, although I would have preferred to issue it nearly a quarter of a century ago.—*Richard Trevors.*

CHAPTER I

Dream of a Scientist

WHEN I first met Wendell, he was a grave-looking, bearded man of thirty-three, with a face already so seamed and worn that one would have thought him well past forty. By profession he was an engineer; but as this was one of those periodic eras of depression which characterized the late twentieth century, he was fortunate to be eking out a bare existence on the staff of *Bridges and Aqueducts*, a trade publication.

Yet with spare funds that he had thrown together I do not know how, he had equipped a laboratory in the basement where he slept and cooked his own meals.

I can remember the singular impression the place made on me when I first entered it: the chemical odors, mingled with the scents of the frying pan; the

shelves, with their jars of salts and acids; the work-table; the rows upon rows of metallic tubes, gleaming and polished, about two inches in diameter, and twisting in all directions; the gas-stove in one corner, which served in his experiments no less than for preparing his dinner; and the mattress at the opposite end of the room, where he would throw his exhausted form.

"Mr. Trevors?" he said, as I stood hesitantly at his door. And he flung out his hand to put me at my ease; his thin worn face, which looked anemically pale where the thick bushy growth did not cover it, blossomed with a smile that won me to him instantly.

"Step in; though I'm afraid it will not be worth your while. I'm engaged in experiments in which I must have some one to assist one or two evenings a week, but the devil of it is that I can't pay more than a pittance."

As a graduate student at college, struggling for a Doctor's degree in physics, I was in need of all the pennies I could earn in off hours; and I had no hesitation about accepting, not even considering I was strangely drawn to my prospective employer.

"I might as well tell you what it's all about," he continued, as we entered the room and I seated myself on a three-legged stool with part of its underpinning missing, while he paced back and forth and spoke in an intense, nervous manner. "You'll have to know what I'm driving at, if you're to be of any help. You see, I've an idea in transportation which will outmode all present-day methods. It's based upon the principle of the rocket-car—"

"Rocket-car?" I exclaimed, reflecting that this was nothing new. "Why, that's been dreamt of ever since the nineteen twenties and thirties. Visionaries have thought of rockets that would send people across the Atlantic in

twenty minutes—”

“Exactly!” returned Wendell, with a nod. “And why has the idea never succeeded? At root, it is sound enough. By means of an explosive hydrogen-oxygen compound, as everybody knows, we can send a rocket laden with passengers into the stratosphere, and get it going at a speed of more than a hundred miles a minute. But what happens when the vehicle attempts to land?”

“We have yet to see the example of a successful rocket flight. The take-off is usually all right—the travelers manage to get away without trouble. It’s the come-down that provides the little joker. As things go at present, it would be a miracle if any one landed alive.”

“Theoretically, they should be able to,” I argued. “The principle seems simple enough. To slow the car down, all that is necessary is to put the motors in reverse, providing a series of explosions in the opposite direction. When the speed is sufficiently retarded, airplane wings are unfolded, and—”

“Yes, but going at such a speed it is impossible to control the car,” Wendell interrupted, impatiently. “Either it stops too suddenly, and falls to earth like a plummet, or the pilot undershoots or overshoots his mark and comes down miles from any landing field. That’s inevitable, by present methods. And that’s why I’ve thought of an invention to make rocket travel safe.”

Suddenly he paused in his ramblings across the floor, and stood stockstill, regarding me with a keen, fixed, sagacious light that held me magnetized, so much did it seem to show of fire, strength, and

unflinchable self-confidence. Somehow—perhaps due to the very power of suggestion—I too felt faith in Wendell, a faith that was never to wane; and it was not only with the enthusiasm of youth, but with the budding admiration of one who already recognizes his master, that I listened as my new employer proceeded:

“The only possible way of controlling a car moving at rocket speed, is to shoot it through a tube—as a bullet is shot through a rifle barrel. Then one can be certain of its course, can check it at the proper point, and know that it will land where one desires. There are difficulties, of course—”

“How about friction?” I put in. “Wouldn’t the speed of contact with the air burn it to ashes?”

“There would be no contact with the air,” Wendell stated. “The tube would have to be a vacuum.”

“Even so, wouldn’t friction with the sides of the tube—”

“Naturally, that must be provided for also. The tube would be wide enough to permit the vehicle to pass through it without touching either wall. Automatic radio controls within the tube would hold it to its course, preventing the slightest deviation. The car would be constantly under as perfect control as a locomotive on the tracks—”

“Holy Jerusalem!” I exclaimed; and let out a low whistle of surprise. “You don’t ask for much, do you? Great metallic tubes scores or hundreds of miles long; the air withdrawn to make vacuums of them; and automatic controls established—”

“I didn’t say it wouldn’t be difficult,” interrupted Wendell with a look of today, such as the building of a railroad scorn in his deep-set, glittering eyes. “But things which seem commonplace across the continent or the laying of the Atlantic cable, once appeared equally

* The Floyd-Hawley expedition of 1963 crashed in the ocean. The Wilcox-Jones party came down in flames on the New Jersey coast. Their cremation was so thorough that no trace of them was ever found. The William Brannert car disappeared entirely—might now be cruising round the moon.—Richard Trevort.

remote and impossible. It would call for the expenditure of millions—hundreds of millions—and would require the labor of thousands of men for years. But there is nothing in excess of technological possibilities."

"See here!" he exclaimed, after a moment, with a sudden change of manner, as he led me over to a table, on which the two-inch metallic tubes I had mentioned were coiled in great confusion. "I have made a model of the whole thing! I have tested it out in miniature! And it works! It works on a large scale, too!"

In his eyes I detected the gleam and passion of the zealot as he showed me a minute projectile no thicker than my little finger, clapped it into an iron projection, and shot it through many scores of feet of tube in the time between two ticks of the clock. Already I was beginning to catch the contagion of his enthusiasm; and I was more like disciple with teacher than like employee with employer as I questioned him as to the vacuum tubes, the various possible motive powers, and other features of his invention.

CHAPTER II

Disappointment of a Dreamer

SUCH was my initiation into the idea of the Tubeways. Before many weeks had passed, I had become as much an enthusiast as Wendell himself, and had quite forgotten that I had been engaged as a mere laboratory assistant. I went over with him elaborate plans for hydro-electric suction pumps, which were to draw the air from the tubes and make them as empty as the spaces between the stars; I debated with him the details of the radio controls, and was as eager as he to build a larger model of the invention, in which to test its possibilities more fully.

Even when, after a few months, Wendell lost his position on *Bridges and Aqueducts*, and was unable to continue the small payments he had made me as his laboratory assistant, my own interest in his experiments brought me several times a week to the basement in which he still labored, and I gave more of my hours than ever on behalf of his invention.

To most of us it is given to witness at least one great drama in the course of our lives. In my case, the drama was that of Wendell and his struggles for the Tubeways. And always, though I am predominately mechanically minded, the major interest for me was the human element in the contest. It seems to me that the day of gods on earth is not yet over when men will fight for an idea as did Wendell for his invention.

I recall the time, two years after our first meeting, when I came to his basement, and found him looking haggard and perturbed.

"Trevors," he said, turning to me with sad, bloodshot eyes, "I have been faced with a great temptation. A man in my place should not think of such things as love or marriage, yet I have had the poor sense to fall head over heels for a girl. I am haunted by the thought of her—to me she is the most miraculous creature ever born. I *could* marry her, too—her father offers me a job as superintendent in his sheet-metal works, if I will settle down, and forget, as he puts it, 'my fool inventing notions.' Of course, the idea is impossible. I have my mission to fulfill."

With a sigh, he turned from me—and never have I felt a man to be nearer the breaking point. Even at the moment I, the one other believer in his project, wondered if it were not his real mission to be happy. I saw him, gaunt of frame and hollow-cheeked, turning back to his basement laboratory, where he pot-

tered over some electrical wiring; and as I hastened to lend a helping hand, I found myself for the first time unable to bring from his lips any word of enthusiasm for the Tubeways.

How he earned his living during those hither years is a question that I can answer only in part. Once I encountered him, grim-faced and sullen, occupying a post as night watchman for a railroad.

"This gives me the day for my experiments," he explained.

Once, I know, he was elevator operator for a week in a large apartment house; but his abstracted air evidently did not win him the favor of the management. Once, on a side-street, I met him directing a group of boys passing out handbills for a breakfast food. On another occasion, as he confessed to me, he tried his luck as a salesman of electric stoves; again, he filled in a Christmas shift as a demonstrator of mechanical toys at a large department store; while on several occasions he was fortunate enough to secure employment with engineering concerns, but gave up the positions when he found they allowed him no time for his invention.

During all these years, when sometimes he had nothing more than dry bread and sugarless coffee for days on end, he was more proud than Lucifer himself; he disdained all public relief; and nothing would offend him more than the offer of private financial assistance, as I knew from the outraged expression on his lean sensitive face when, having secured my appointment as First Assistant in Physics in the Manhattan High Schools, I was so tactless as to attempt to force a check into his hands.

He did, it is true, accept under protest occasional indispensable equipment, which I ordered sent to his laboratory. This, he explained, was for the sake of "the cause," and therefore he had no right to refuse it. Yet he kept

an itemized account of the articles, and declared that I should be reimbursed "with compound interest" when the Tubeways at last succeeded.

But both of us knew that something more was essential for success than his efforts or my occasional gifts. To demonstrate the principle of the Tubeways on a large scale would require capital—a vast amount of capital; it would be necessary to find interested investors with millions to risk.

Here Wendell seemed face to face with a blank wall, for he was without acquaintances in the financial world; nor was I able to help in this regard. Yet even here he did not feel himself daunted. With a determination all the more admirable since the quest seemed a hopeless one, he addressed himself to various persons of means, proclaiming the merits of his case and asking for an interview.

Often of an evening, when I dropped in unexpectedly, I would see him squinting beneath the glare of a naked electric bulb, pen in hand while he addressed an envelope or filled a sheet of notepaper with his labored, meticulous script.

"Any success yet?" I would inquire; and he would sigh, and nod in the negative.

"Not yet—but soon," he would declare, wrinkling his brows resolutely, almost fiercely. "If I keep on trying, it must be soon!"

But months went by, and he wasted much sorely needed money on stamps and stationery. Then, still hopeful, he tried another method; he haunted the offices of wealthy magnates as assiduously as a hack actor pursuing a theatrical agent. Of his trials and humiliations during these days, I have only fragmentary accounts; but I know that he was knocked around from telephone operator to office boy; that he became a standing joke among twenty-dollar-a-

week clerks and gum-chewing stenographers; that his harrowed, bearded figure, with the haggard trousers and the shirt ravelled at the collar, was a familiar sight in oak-paneled reception rooms as he waited for hours for some financier who, he was told, was just then "in conference."

It may be because he made a nuisance of himself; or because his bulldog pertinacity aroused curiosity; or, more plausibly, it may have been a matter of mere chance—but eventually he struck a turn in his luck.

I shall never forget the evening when, instead of waiting for me to make one of my periodic calls, he burst excitedly into my study. I was a little annoyed at his unexpected intrusion, for I had been busy preparing a set of examination questions in General Science B4; but one glance at his glowing, exalted face assured me that the examination questions would have to wait.

"Trevors! Trevors!" he exclaimed, not taking time for any formal greeting. "I have news for you! Great news!"

To judge by the trembling of his fingers and the jubilation in his dancing eyes, I knew that his tidings must be something altogether out of the ordinary.

"What is it?" I inquired, jestingly. "Have you been knighted by the King of England? Or asked to have your bust placed in the Hall of Fame?"

"Something better than that! Much better!" he cried, not even glancing at the chair I held out for him, while he rambled about the room like a man gone mad. "I have seen Swanson—you know, the great Swanson—"

"You mean, James Swanson, the head of the Associated Steel Corporation?" I demanded, naming one of America's wealthiest men.

"Yes, that's him! James Swanson, Senior! We had a long talk, for over

an hour! A fine man, Swanson! Smokes a superb brand of cigar! Was very encouraging—most encouraging!"

"You mean to say he's going to help you?"

"Most likely—more than likely!"

Wendell did a turn or two about the room, pirouetting lightly on one foot, like a youthful dancer. "He says he'll send a man down tomorrow to investigate my model. If it's at all what I claim, he promises that Associated Steel will build a full-sized Tubeway, forty or fifty miles long, in which to experiment with a real rocket flight. It's a cold business proposition with him—the construction of Tubeways would greatly stimulate the steel industry."

"What do you care about the steel industry?" I almost yelled in his ears.

"Not a tinker's damn! But my life's in the Tubeways. When they've erected their fifty-mile section, I'm to travel through it in a rocket-car on an experimental flight. If this succeeds—I mean, when it succeeds—my work will have been consummated. Think of that! My work will have been consummated!"

Again he skipped exultantly about the room; then suddenly, with a gasp, sank down exhausted on a sofa. His breath was coming hard and fast; his face had turned pale; I had the momentary fear that he was about to collapse.

"Better watch yourself, Wendell," I remonstrated. "Too much excitement is not good for the heart."

Late into the night we discussed his prospects, whereby Associated Steel, if it approved of his invention, would purchase it in return for a substantial royalty on the proceeds. And all during the following days, when several of the company's engineers reported enthusiastically on Wendell's model, our discussions were continued at white heat. My friend was living in the clouds and

it looked as if he were never again to come down to earth.

CHAPTER III

Realization of a Dream

THERE came the day when the directors of Associated Steel, assembled in executive session, approved President Swanson's recommendation and voted a huge sum for Tubeway construction; and during the entire three years that followed, when a steel pipe twenty feet thick was erected on a trestle across forty-seven miles of fields and woods in the Ohio Valley, Wendell was like one who daily sipped of nectar and ambrosia.

Naturally, so gigantic a project could not be undertaken without arousing widespread interest. There are millions still living who recall the articles in newspapers and magazines, the pictures of the partially completed tube, and the whispered conjectures as to whether it would succeed or fail; and there are other millions who were among the pilgrims to the scene of construction, and who looked on in amazement and wonder at the great glistening mass curving majestically far across the countryside.

But vast though the public interest in these preliminaries, it was nothing beside the furor when, after three years, the Tubeway had been completed and was announced ready for the trial flight.

Speculation now ran higher than ever as to whether the enterprise would succeed; bets flew back and forth, with the odds about even; reckless investors, on mere "hunches," bought large shares of Tubeway stock, in the hope that an initial success would send it soaring; while chronic sceptics stood by on the sidelines, predicting that something would go wrong.

All this meant that enormous crowds

were assembled at the spot near the outskirts of Cincinnati, where the Tubeway began; that newspaper reporters jostled one another to be first on the scene; and that hundreds of millions of onlookers throughout the world regarded the trial flight as something in the line of a major sporting event.

There had been hundreds of volunteers to enter the rocket-car on the long-heralded Fourth of July, 1958, when the experiment was to take place; but Wendell had held to his original intention to make the flight himself, and to make it alone.

As the historic occasion approached, I was a little alarmed to notice how excited the inventor was becoming; how his hands would tremble, and his eyes stare with a wild jubilant light at the mere mention of the Tubeway; and how, exhausted by his very enthusiasm, he would sometimes sink panting into a chair, unable for the moment to catch his breath.

"Take it easy, man, take it easy!" I would counsel; for I knew that Wendell, through extreme hardship and overwork, had no longer his former strength, and might overtax himself. And it was with a secret, constantly growing dread that I looked forward to July fourth.

Yet all the preparations had apparently been made with the greatest attention to detail; seemingly no precaution that might contribute to success had been overlooked. Not once, but many times, rocket-cars without passengers had been shot through the tube, and, after less than three minutes and a half, had safely reached their destination. Then, finally, a cat and a dog had been transported without mishap.

It therefore only remained to be seen how well a human being would stand the flight. But since the acceleration and retardation were to be gradual (and, in fact, were to occupy more than three-

quarters of the time occupied for the flight), it was believed that the human nervous mechanism was capable of the adjustment.

There was one unusual precaution that Wendell took—a precaution unknown to the public. In the rocket-car, despite its limited space, he installed a small motion picture camera, which was to operate automatically during the period of the flight.

"I want a record of my exact reactions, Trevors," he explained, smiling confidently. "I want to prove that a man can act as normally in a rocket-car as when cruising in a trans-Atlantic plane or other old-fashioned vehicle. These films will offer the culminating proof."

The morning of July fourth arrived; and with a heavy heart, despite the spirit of celebration that vibrated from the air, I accompanied Wendell to the entrance of the Tubeway, from which the flight was to begin precisely at noon. Our approach was like that of a triumphant general; everywhere our path was lined by cheering crowds, who waved banners, sang songs, and shouted applause.

The further we advanced, the deeper grew the uneasiness within me; and I played the traitor to my friendship with Wendell, to the extent of wishing that something would turn up to postpone the flight.

Yet apparently everything was in excellent working order. The Tubeway rose, glistening and immense, from the center of a field where scores of guards held back the impatient crowd; and a great steel projection, like the inverted body of a siege gun, except that it was eighty inches thick and several hundred yards long, contained the rocket-car at its nearer end, while at its farther extremity it widened into the twenty-foot Tubeway.

"Well, Trevors, wish me luck," exclaimed Wendell, as, redfaced and shaking in every limb, he seized my hand in a long, vigorous clasp—and, the next moment, was lost amid the crowd of engineers and officials of Associated Steel.

So great was my emotion that I could not find words to answer him. Grown man though I was, I felt the tears trickling down my cheeks. I do not know through what power of intuition it was, but I had the sense that I should never see him again.

Ten minutes later his thin form, still quivering (as I was later told) had disappeared into the rocket-car, and the door had closed behind him. Twenty minutes later, while the scores of thousands of spectators stood by in awe-stricken interest, a gong sounded with a metallic clang, announcing the noon-hour; and, simultaneously, there came a dull booming from within the Tubeway, and we knew that the rocket-car was on its way.

The sequel is only too well known. Less than four minutes later, a similar booming was heard at the other end of the Tubeway, forty-seven miles to the west; and the vast multitude assembled to greet the tube-traveler burst into cheers.

It occasioned a little surprise when, after a minute or two, the hero failed to appear; and apprehensive whispers began to circulate when, after another five minutes, he still had not come out.

Then it was that officials set about to investigate, opened a door, and brought to light the rocket-car, which had completed the flight undamaged. But when a second door was opened and the investigators looked inside the car itself, they let out low gasps, followed by loud, excited cries.

Strapped against the rear wall, in the pilot's seat, was the still form of the inventor. His head hung forward help-

lessly; one hand was pressed against his heart; hut in his wide-open eyes, despite the suggestion of pain, there was a look of ecstasy.

As all efforts to revive him proved futile, the obvious conclusion was reached. The human body was unable to endure the strain of a Tuheway flight! All Wendell's efforts and his final sacrifice had been for nothing; Associated Steel had thrown its millions into a blank hole in the earth; and the forty-seven mile Tubeway, if not dismantled for scrap metal, would long remain the mute symbol of an unrealizable project.

So the world concluded, in those first stunned days of disappointment following Wendell's failure—and such, it is certain, would have been the view of the future, had it not been for the precautions taken by the inventor himself. Amid the general grief and horror, and the world-wide rites of mourning in Wendell's honor, more than a week had passed before any one thought of the motion pictures made by the automatic camera in the rocket-car.

Then, as a mere matter of routine, the films were developed. But little had any one foreseen what they were to reveal.

I well remember the occasion—I was one of a small gathering in a studio of Associated Steel. While we sat breathless and solemn, the screen showed us Wendell, life-sized, as he entered the rocket-car, fastened the door, and adjusted the straps about his frail, trembling body. We all could see how intensely agitated he was; his limbs shook, and he made violent, spasmodic

movements, as though unable to control himself; then how, of a sudden, he gave a lurch forward, clutched at his heart, was swept by one or two sharp tremors, and quickly became still, with his head hanging forward in the position in which he was later found.

At this moment, we noticed, the clock on the car-wall, which had been carefully tested and adjusted, recorded precisely 11:58. Yet the flight, as we well knew, had not begun until twelve.

In a flash, the truth burst upon us. Wendell had not been killed by the flight. He had died before it began, the victim of a heart attack brought on by his own excitement.

This was the knowledge which, conveyed to the world, revived interest in the Tubeways. This was the knowledge which induced other daring souls to risk their lives in Tuheway flights, and led to Wendell's vindication: to the proof that living men and women could be safely shot through the tubes.

All this is a mere commonplace today, in the era of Tubeway expansion, when it is possible to travel by Wendell's method from Lahrador to Mexico City and from Vancouver to Key West. But few of us nowadays, when we board an express rocket in order to keep a luncheon appointment with a friend a thousand miles away, realize with what struggle and heartache the inventor of the Tubeways achieved his conquest of space. Hence I am making the story public in order that the world may at last do full justice to one who was not only a great scientist, hut, in the deepest sense of the words, a great human being.

THE AURORA BOREALIS

The frequency of the Aurora Borealis varies with the latitude of the place. It is comparatively rare within forty-five degrees of the equator, but more frequent in the northern latitudes, up to about latitude sixty degrees where it sometimes becomes almost a nightly occurrence. The Aurora is less frequent near the poles, contrary to general belief. There is no specified time for the northern lights to appear, and the cause is incompletely understood. There seems to be some connection between sunspots and the appearance of the auroras. Probably they are merely an electric luminosity of very rare gases. It is certain that the auroras are connected with the magnetism of the earth and that a strong influence upon the magnetic needle is exerted in some manner.

THE EDITOR'S OBSERVATORY

(Continued from page 6)

itself an interesting item, but we prefer to believe that it wasn't weather forecasting. The flood was just a bit too thick to be just our usual rainy week-end. We are told Noah was warned by God in a dream of the coming flood, and told to build an ark. At least, that is what Noah told the people. Perhaps Noah wasn't telling the truth?

To support the theory that Noah wasn't exactly truthful, we must consider what the people would have done and said had he told them that by astronomical observations, he predicted that a descent of great masses of water was due to deluge the earth with the greatest flood and tidal wave of its history. Even today, scientists are without honor in their own country. Too many of us scoff at new discoveries. In those days, they did more than scoff. They quickly killed the incautious predictor.

Some scientists hold to the theory that in the final stages of its creation, Earth was surrounded by a sort of bubble of water which hadn't broken and descended to the surface. Referring to the Bible, you'll note reference to waters above waters, references to "firmament" and heavens, two distinct and separate things, also to a lack of rainfall, a constant temperature, and a watering of the earth with dew, prior to the flood. Also you'll note that the rainbow (could you imagine a rainbow not forming after a storm when the sun's rays broke through the clouds?) did not appear until after the flood. Was it because this "bubble" retained Earth heat, prevented rainfall because of constant temperature, and did not allow the sun to evaporate the surface waters? Does the Bible even mention clouds?

Maybe Noah was the first real scientist? What do you think?

* * *

RAYMOND LOEWY, naturalized American, born in France, is one of the foremost industrial designers of today. His clay models of vehicles are to be exhibited in the Transportation Section of the 1939 World's Fair to be held in New York.

As a boy he dreamed of engines and machines in terms of beauty, and is now realizing his ambition by designing all manner of things from lipsticks, cigarette cases, and typewriters, to locomotives, liners and aeroplanes, producing products which combine both beauty and efficiency.

He played a leading part in the streamlining of one of the new Pacific type engines of the Pennsylvania Railroad. Observations on the running of locomotives led to the design of a model in clay and to its testing in a wind-tunnel, in which the various effects of air resistance could be studied. The front of the boiler was rounded off with a bullet-like nose, and the "cow-catcher," headlight,

and projecting parts which create air resistance were skillfully blended into graceful contours sweeping back into the cab.

He has been described as "one of an inspired handful of men who are quietly changing the physical appearance of the world we live in." He shapes the future out of clay instead of a crystal ball, and his studio is a place of engineering magic filled with the wonders of things to come.

* * *

THE most perfect machine in the world is the body of man. The further we advance in our knowledge of it, the more we wonder at the ingenious mechanisms which are crowded into its structure. As time goes on, we find that science is continually discovering new functions, new operations in it, which have a profound influence over our life. We continually delve into more subtle and unexpectedly complex functions, and are amazed at the marvels of their performance. Gradually we are coming to understand the how and why of every little bit of machinery of the body. And as yet, we are far from the ultimate answer.

Nature's most perfect achievement is the animal body, and immeasurably the oldest of her works. For at least 50 million years—how much longer we can't ascertain—the animal body has been in the making. Nature has been developing, improving, adding new organs, co-ordinating their functions in a delicate balance that has never been equaled in any other thing.

And down through the tens of millions of years, these flesh machines have been subjected to fierce stresses and trials, and today, the final and most finished product is the body of man. Time and environment are the greatest of engineers. How marvelously they have constructed we are learning day by day.

And the most significant feature of human development is the perfection of the brain which now begins to aid in the development and improvement of its own evolution. The human body is being aided in the further climb upward by a science created by a brain whose aim is the ultimate elimination of disease, of break-down in the complex machines nature has fashioned in the human body, of corrections of aberrations in those machines, of improvement in their functions, and of development of those which lag.

Man's brain is taking over the duties of nature, has begun to understand and control the body which houses it. Perhaps someday the time will come when man will be able to repair, to replace worn out machinery, and thus gain a measure of immortality, of which he has so long dreamed, and which seems his rightful birthright.

* * *

The average temperature in man is about 98 degrees Fahrenheit. Many birds which are constantly in motion have higher temperatures—from 100 degrees to 113 degrees Fahrenheit. Swallows and fast-flying birds have higher temperatures than birds or fowls that stay near the ground.

SCIENCE QUIZ

We present the following science questions and problems for your entertainment, and at the same time as a pleasant means of testing your knowledge. How many can you answer offhand, without referring to an authority? Par is 70% correct.

SCIENCE TEST

- One of the following substances is crystalline: alcohol, graphite, lamp-black, coral.
- The black on a film negative is: light, dirt, silver, ink.
- The speed at which all known types of airplane wings cease to give adequate lift is: 300 m.p.h., 500 m.p.h., 730 m.p.h., too fast to worry about.
- The number of islands in the British Isles is (approx.): 10, 50, 200, 5,000.
- S. T. P. is an abbreviation for: stop tickling please, Swiss time piece, Stillwell's timed projections, standard temperature and pressure.
- An electron, atom, proton, vitamin is the smallest.
- A beat note is: swing music, a sound made by a steam hammer, a sound produced when extra high frequency sounds are used, the movement of a pendulum.
- The basis of organic chemistry is: oxygen, carbon, water, carbohydrates.
- The density of ice is: very small, greater than that of water, less than that of water, same as that of water.
- Water boils at: 212° centigrade, 0° centigrade, 100° centigrade, 180° centigrade.
- A rock that gives off a bell-tone when struck is: obsidian, granite, marble, phonolithic volcanic rock, singing Pharaoh.
- Termites are: fleas, small turnips, white ants, grasshoppers.
- The lightest of the following is: aluminum, helium, hydrogen, coal gas.
- The heaviest of the following is: platinum, gold, uranium, osmium.
- The Torricellian vacuum is: a type of floor cleaner, the void, the empty space at the top of a barometer, nothing at all.

TRUE OR FALSE

- Dry farming is a scientific farming by irrigation of land where there is a limited amount of rainfall. True..... False.....
- The average distance an aviator has to fly in writing one word of five letters in the sky is five to seven and a half miles. True..... False.....
- The "Supreme Law of the Land" is the law of gravitation. True..... False.....
- The "gamsbok," a large animal of South Africa, never drinks water. True..... False.....
- Each day begins at the eastern extremity of

East Cape, Siberia, before it begins anywhere else. True..... False.....

6 The body paint on a car would be injured by washing it with gasoline. True..... False.....

7. Wine is "dry" when 0.1 per cent of its sugar content remains, and fermentation is said to be complete. True..... False.....

8. Man has a far greater power of visual perception than a bird. True..... False.....

9. Five story buildings weighing as much as 4,000 tons have been moved. True..... False.....

10. The biblical deluge was the worst flood in the history of the world, so far as loss of life was concerned. True..... False.....

11. The latest element to be discovered was named Ithium, in honor of the university at which it was discovered. True..... False.....

12. 1.07 per cent of the babies born in the United States are twins. True..... False.....

13. It is the better policy to wear one thick undergarment in the winter rather than two thin ones. True..... False.....

14. Alphonse Bertillon invented the system of finger-printing for identification in 1879. True..... False.....

15. Limburger cheese smells as it does because of specific fermentations during ripening, induced by the moist condition in which it is kept. True..... False.....

STRIKE OUT THE WORD THAT DOES NOT CONFORM

- Water, mercury, milk, bismuth, syrup.
- Fracture, fissure, crater, mountain, abyss.
- Straight, level, variegated, uninterrupted, consistent.
- Deploy, scatter, congregate, dissemble, separate.
- Renew, enliven, revive, regurgitate, restore.

SCRAMBLED SCIENCE TERMS

- A scientist. MICHEYS
- Degree of combining power of an element. ACEVELN
- A chemical mixture. COPDOUMN
- A gaseous element. NORAG
- Microscopic living organisms. TEBARIAC

PROBLEM

A hunter, seeing a bear, brings his rifle hastily to his shoulder and fires due south. He injures the bear but doesn't kill it. In an attempt to escape, the bear runs 65 yards to the west. The hunter fires due south again, and this time kills the bear. What color was the bear?

(SEE PAGE 146 FOR ANSWERS)

QUESTIONS — and — ANSWERS

This department will be conducted each month as a source of information for readers. Address your letter to Questions & Answer Department, AMAZING STORIES, 638 S. Dearborn St., Chicago, Ill.

Q. *Do scientists know anything about the temperature of Mars?*—Erwin Wilson, Birmingham, Alabama.

A. According to observations made by Dr. Co-blantz of the Bureau of Standards, during a recent opposition, the surface temperature of Mars seems to be warmer than it had been previously estimated. He discovered that its daytime temperature, around noon, was sometimes as high as 40 degrees to 60 degrees Fahrenheit. This is very well suited to human life, and so far as temperature goes, we would not be inconvenienced. These temperature tests were made with red and violet light, which revealed a much denser atmosphere than had been previously supposed. This discovery raises the surface temperature readings.

Q. *What means is used to measure the gravity of another planet? How can these findings be considered accurate?*—A. K. D., St. Louis, Mo.

A. We compute the surface gravity of other worlds by dividing the planet's mass—relative to that of earth—by the square of its diameter. Since these computations are based on Earth standards, we can be fairly certain that they would be accurate on a body which is much the same in relative makeup. Thus we find that we can compute other planet gravities by Earth standards, and discover that a body weighing 100 pounds on Earth would weight only 82 on Venus and 38 on Mars, etc.

Q. *What does radium look like?*—Harry H. Gardner, Western Springs, Illinois.

A. In the form in which it is usually sold, radium appears as a white or nearly white substance which looks very much like common salt, or baking soda. It is obtained from the ores in the form of hydrous sulphate, chloride, or bromide, and it is these salts which are in commercial use.

Q. *Outside of the theoretical "absolute zero" effect on all matter, is there any element which cannot be frozen?*—Adeline Adamski, Chicago, Illinois.

A. Yes. Helium has never been frozen.

Q. *The asphalt used in paving roads is supposed to come from two sources. If there is any other source than Trinidad, where is it?*—M. James, Tucson, Arizona.

A. Your information is nearly correct. There are two kinds of asphalt, but they come from more than two places. Natural asphalt is found in Trinidad, in Bermuda, in Venezuela, and other places. It is found in natural deposits generally

in the form of lakes. The other type of asphalt is a result of distilling asphaltic crude oil from the wells of Texas, Oklahoma, California, and Mexico. This oil is distilled into kerosene, gasoline, etc., and the residue hardens into a substance known as asphaltic cement. It is this cement that is most used to build roads.

Q. *How many different kinds of fish are there?*—Ole Olson, Red Wing, Minn.

A. There are about 20,000 kinds of true fishes.

Q. *How long is a link, surveyor's measure?*—Gilbert Stetz, Buffalo, New York

A. A link is 7.92 inches.

Q. *What are the names of some of the plants that eat flies and other insects?*—L. B.

A. The Venus Flytrap is the most widely and popularly known. Others are the *sarracenia*, the *trussel*, and the *nerpithes*. There are still others, not generally classified.

Q. *Does the compass always point due north, or is there some variation? What is meant by the "line of no variation" mentioned in the Coast and Geodetic Survey?*—Dorothy Reinold, Milwaukee, Wisconsin.

A. No, the compass does not always point due north. In fact, it is only on the "line of no variation" you mention that it does. This line has been charted as running through western South Carolina, and N. N. W. through Michigan, in the United States. The line is quite irregular, and seems to have no definite delimitation. It may be seen on the isogonic chart of the United States, dated 1920.

Q. *What is the speediest animal?*—Arthur Tatum, Wausau, Wisconsin.

A. The cheetah, used in India as a hunting leopard, is supposed to be the fleetest of four-footed animals. However, the cheetah is not a distance runner, and its speed is confined solely to short dashes. It can run down any antelope or deer in a very short time.

Q. *Noting your illustrated feature on Mt. Everest, I am curious to know if the Matterhorn has ever been climbed?*—Charles E. Beard, Covington, Kentucky.

A. On July 14, 1865, a party of mountain climbers headed by E. Whymper, climbed the Matterhorn, the first to accomplish the feat. Their ascent has been duplicated several times since. Three of the party, and the guide, were killed on the initial attempt.

Meet the Authors

EANDO BINDER

Author of

"I, ROBOT"

WHEN AMAZING STORIES first appeared in 1926, Eando Binder did not exist as a single individual, but as Otto and Earl Binder. We were avid science fiction fans from the first, and never missed an issue. Until 1932 we were content to read the magazine, and enjoy it. But then we began to get a bug in our ear and the resultant buzzing in our respective heads caused the formation of the writer whose name was to become fairly well known in AMAZING STORIES and other science fiction magazines. He was Eando Binder, a combination of our first name initials with the word "and" between.

The result was the writing of such stories as "85 & 37," "The First Martian," "The Chessboard of Mars," "The Blue Beam of Pestilence," "The Chemical Murder" and others. We even crashed through with a long novel called "Darkness and Dawn" in which we ambitiously tried to show the history of man from prehistory to the end of the world. Many readers claimed this our best work. Thus, it was that Otto and Earl lost their identities and became merged into a single man.

However, this combination no longer exists. Eando Binder is not two men, but a pen-name for one man, and that man is myself. Brother Earl still acts as agent, and manages to sell quite a bit of fiction to our favorite magazines. Science fiction always has, and always will be my favorite field of expression.

I now live in New York, am still unmarried, and devote full time to my writing. I am addicted to bridge, and a long feud has flamed between myself, Mort Weisinger, his brother Edward, and Julius Schwartz, all as crazy about science fiction as myself. Many bridge meetings have resulted in science fiction plots, so it's a matter of grinding two axes with one stone, or something to that effect. I was once an amateur chemist with a home laboratory, and managed to create several very distinctive and effective odors, or should I say, mal-odors. I hope to live long enough to see some form of atomic power and perhaps a try at space travel, because I believe in both.

Brother Earl still lives in Chicago, where he

leads a comfortable married life, employed as a parts inspector for a large industrial concern. Since the parting of the Eando team, I've been forced to struggle along without Earl's wide range of experience in the school of life. I am somewhere between 25 and 30 years old, with a lot of ability to learn more about life, and the art of instilling it into my stories.

It is my belief that science fiction is going through the same evolution the old westerns and detectives did. They will become very popular.

and I predict that many new titles will greet the reader from the newsstands, and when they do, the name Eando Binder is going to be right there to aid in the greeting. Even though he doesn't exist any more, he still retains enough of his identity to completely blank mine, and personally, I'm glad he has. It would seem to indicate that Otto Binder hasn't exactly been a failure. At any rate, I'll be in there punching for him for a long time, I hope.



OTTO BINDER

A ROBOT speaking in the first person sums up the basic idea of this story. The idea struck me like a bolt of lightning. Who could tell what happened to a robot better than the robot himself, assuming

him to be of near human intelligence? Such a robot, in a sense, is actually a "form of life," rather than just a mechanical man. He would have his own personal opinions, prejudices and outlook.

The Frankenstein theme rears its head almost automatically with the mention of a robot. I thought it a good spot to reverse that formula and actually use it as a foil for a different sort of robot evolution. I wanted a robot who could see the human point of view, even if he couldn't quite understand. And one that proved that it was his environment that molded him as much and as thoroughly as it does a human being.

As for the robot being made humanly intelligent, that may not be so fantastic as it seems to present-day science. In the final analysis, it may be only a matter of sensitivity of apparatus and the application of around-the-corner discoveries of the exact mechanism of human thought. Although I personally rather shudder myself at the possibility. I can do without thinking robots!

Eando Binder, New York, N. Y.

R. R. WINTERBOTHAM

Author of

INTERPLANETARY GRAVEYARD

I WAS born Aug. 1, 1904, in Salina, Kansas, and I have been trying ever since to get acquainted with the world by long distance. For, with the exception of two years when I was employed on newspapers in several other Middlewestern States, I have lived in Kansas all my life.

Exactly 34 years after I was born—to the day—I wrote the first draft of "The Interplanetary Graveyard." It was not my first story, for I have been writing fiction for three years and I have written constantly since I first began to collect local items for my home town newspaper thirteen years ago. I have sold about 40 pieces of fiction, including about a score of magazine shorts and the remainder children's books. I am not including quite a large number of newspaper stories, which city editors told me were almost entirely fiction, because the facts apparently had dropped out of the continuity.

My first acquaintance with the magazine and book field was in 1928-1931, when I worked on the staff of Haldeman-Julius Publications in Girard, Kansas. I took a premed course at the University of Kansas and I have been interested in science since that time. My first sale of science-fiction also was my first sale of a short story.

The story, "The Interplanetary Graveyard," floated around in what I jokingly call my brain for several weeks before I did anything about it. As the story indicates, the FitzGerald contraction hypothesis was the initial impulse. I hardly know how the idea finally took form, because the final product was far different from the way I "thought it out" before writing. (It is next to impossible for me to write a story according to any set outline.) But I started it on Aug. 1, 1938, and finished it two days later.

As for hobbies and opinions? My only hobby is my two-year-old daughter who just got a new tricycle. All of my opinions are subject to change without notice, because no scientist (and a science-fiction addict is a scientist of sorts) can afford to hold dogmatic ideas about anything. If I may have just a tiny opinion for myself, I think that cold beer is a nice drink.

MANLY WADE WELLMAN

Author of

BATTLE IN THE DAWN

AGE—over 30 years. Height—over six feet. Weight—over 200 pounds.

Born in Portuguese West Africa, of American parents, where my father did medical research, I had a savage childhood. It made me no jungle god like Tarzan—more like one of his apes. At seven came to America, via Portugal, France, England. Educated in Washington, Wichita, Dodge City, Salt Lake City, Minneapolis, New York. Took two university degrees, neither deserved. In school was a fair boxer, a clumsy footballer, not much of a discus thrower. Now I fence—strongly but not brilliantly—sometimes swim, and I've never been outwalked in rough country.

Professionally, I've been repeater, harvest hand, actor, soldier, factory hand, canvasser, movie critic, bouncer, cow hand, coal heaver, house painter, book seller. Between times, during the past dozen years, I've written rams of fantasy fiction. Sometimes editors have bought it.

I love swords, the tropics, German folk songs, Scandinavian women, French cooking, English tailoring, Spanish wine, and mythology of all nations. I can't understand swing music, quadratic equations, militarists, advanced contract bridge, Oriental philosophy. I believe in God, ghosts, the ultimate success of interplanetary travel. My ambitions are to visit innermost Tibet, to own and sail a schooner, to publish sixty novels, to become an authority on American occultism and demonology, to ride in a space ship, to retire when old to my birthplace in west Africa.

I live on a New Jersey hillside, with a wife and a Persian cat.—*Manly Wade Wellman, New Jersey.*

FREDERIC ARNOLD KUMMER, JR. Author of
THE TREASURE ON ASTEROID X

HERE'S that man again! This time it's a story of buried treasure and Captain Chance, a two-fisted, quick-thinking adventurer. Ever since I read *Treasure Island* many years ago I've had a weakness for treasure stories, but the nearest I ever came to finding any myself was the discovery of a secret drawer in an old bureau and in the drawer several eighteenth century coins worth, alas, only about five dollars all told. We live, I fear, in a very prosaic era. Three hundred years ago we would have lived in a world of swash-buckling romance . . . and three hundred years from now there may be equally lawless and exciting times in the conquest of space.

THE TREASURE ON ASTEROID X was like Topsy . . . it just grew. First of all I was struck by the possibility of buried treasure on one of these queer little worlds. Next, it occurred to me that an air-purifying unit such as must be used in interplanetary travel could be adjusted to create a very silent, deadly, and efficient weapon. Again, it dawned on me that it was possible for a clever man to break his way out of an aluminum-decorated (aluminum for lightness in space ships) prison using a quart of water and a simple mercury barometer. And so the story came to life. I hope you like it. If you do, write in and let me know. And if not, tell how you think it might have been improved. After all, we writers are writing for YOU and we want to give you what you want. And how carefully do we read your letters in the next month's issue to find out whether we're due brickbats or bouquets! So let us know, and I hope I'll see you soon again!—*Frederic Arnold Kummer, Jr., Baltimore, Md.*

ED EARL REPP

Author of

THE SCIENTIFIC GHOST

PROBABLY the fact that the idea for THE SCIENTIFIC GHOST materialized when I was

engaged in my archaeological hobby of removing the skeletal remains of an early California aboriginal makes it somewhat unusual. But it is so, nonetheless.

As I was removing the dark bones of the man who probably lived along the California Coast from 500 to 2000 years ago I wondered what might happen should this ancient Indian suddenly return to life almost in my hands. Many other thoughts combined to enhance such a situation. What tales the man could tell; what revenge he might have to carry out, assuming anyone lived for his targets!

And so with my grisly remains I drove home and all the way the idea intrigued me, and lo, the poor Indian gave birth to *THE SCIENTIFIC GHOST*. Being a motion picture writer and playwright, I had certain other ideas to combine with the possibility of a man emerging from the grave. I had talked with film scientists struggling to salvage fortunes from used and useless film, and so I created John McKenna who turned the trick only to be robbed by an unscrupulous film producer. But McKenna never came back from the grave; though his genius lived on to make life utterly miserable for the producer until his great wrong was righted.

The skeleton of the Indian, however, does not grace my writing den, but reposes in the laboratory of my old friend, Dr. John Harrington of Santa Barbara, who does his exploring for the Smithsonian. Which all goes to show that a writer gets his ideas anywhere and any place, even if he has to dig open a grave to find them!—*Ed Earl Repp, Van Nuys, California.*

* * * * *

JOHN RUSSELL FEARN Author of
BLACK EMPRESS

"BLACK EMPRESS" is an endeavor to conform to the standard of *AMAZING* to produce both an adventurous scientific story with a human interest. The mysterious transformation of a girl one might meet in any walk of life into a ruthless killer, is, I believe, a situation a man might meet up with in the scientific age that lies ahead of us—and to that end I have tried to depict the reasons for the change, and the possibilities that might lie ahead of any one of us.

To write of this story without giving away the solution is rather difficult, but most of it is, I think, based on possible facts. Again, it struck me

when plotting the story that bearded old men usually seem responsible for the world's tragedies and upliffs (in scientific yards of the old school anyway) so I supplied a fresh twist in having a woman do the trick for a change.

The transformation of all forms of life, the segregation of labor and capital, would be almost bound to follow such a ruthless conquest as hers. That, too, I have tried to convey.

I believe indeed, and always have, that we move about among forces such as I have described. How are we to know that each one of us is private unto himself? I do not think so. I believe that the cosmos has minds that have already studied us in every detail—that the things that happened to Madge Cromwell could happen to any of us—only with this possible difference: Super minds may not consider us worth the trouble of experimentation. Can you blame them? When we attain to the realm of pure intelligence, then maybe we will know what these mind forces are that are eternally grouped, unseen around us.—*John Russell Fearn, Blackpool, England.*

* * * * *

STANTON A. COBLENTZ Author of
DEATH IN THE TUBEWAY

I AM an old contributor to *AMAZING STORIES* (under previous management), having contributed a number of hook-length stories such as "The Sunken World," "The Man From Tomorrow," etc., as well as numerous short stories. I have also contributed many times to other science fiction magazines. I am the author of more than a dozen books of prose and verse, and editor of "Wings, A Quarterly of Verse" which I founded in 1933.

A native of California, I began my writing career here in 1919 shortly after graduation from college, as a daily feature writer for the *San Francisco Examiner*. Went to New York in 1920 and remained there as a free lance writer until last June, when I felt I had seen enough of the big city for a while, and a longing for my native woods and hills brought me back to California for an indefinite period.

"Death in the Tubeway" was written here last July; it is hard for me to say how I came to write it, except that my mind was filled with the possibilities of controlled rocket travel for terrestrial transportation.—*Stanton A. Coblentz, Mill Valley, California.*

— TERMINAL VELOCITY —

How fast would a man be falling when he hit the ground, if he fell from a plane at a certain height? This is a question often asked, and more often answered in error than correctly. In an experiment conducted at Wright Field, the velocity of fall was found to be considerably lower than had been expected, considering the law of falling bodies. According to this law, a man would fall 16 feet the first second, 64 feet in two seconds, 256 feet in four seconds, 1024 feet in eight seconds, and so on, the distance increasing as the square of the time. However, air resistance causes this increase rate to become inoperative. There comes a time when velocity no longer increases. This is called the terminal velocity. It is found to be 200 miles an hour, and is reached by a man after falling 1600 feet.

DISCUSSIONS



AMAZING STORIES will publish in each issue a selection of letters from readers. Everybody is welcome to contribute. Bouquets and brick-bats will have an equal chance. Inter-reader correspondence and controversy will be encouraged through this department. Get your letters in before the 15th of each month.

THEM'S KIND WORDS, JACK

Sirs:

What do we want in serials? Heavens! All types of science-fiction by anyone who can turn out the best, of course. Jack Williamson, Stanton A. Coblenz, Earl Vincent, Edmond Hamilton, John W. Campbell, Jr. (Arcot, Wade & Morey), John Taine, Miles J. Breuer, M.D., Edward E. Smith, Ph.D. and Capt. S. P. Meek have turned out top work in the past. Many of these have not yet appeared in the new AMAZING. Two of Eando Binder's best stories were serials. Then there is Nat Schachner, Murray Leinster, Charles W. Dittus, Ed. Earl Repp—but why go on. I'll bet Thornton Ayre could turn out a whopper. But I guess you get the idea.

Cover on the December issue—swell. Inside work—much improved. Krupa is tops here in this issue. I'll bet he could turn out a peach of a cover too.

Because I read J. B. Rhine's fine book and because Eando Binder and I experimented with long distance telepathy using E.S.P. cards, I was especially interested in "Master of Telepathy." A well written story on a very interesting phenomena.

On the subject of covers again—how about some outdoor scenes and scenes in the outer void. This month's back cover is also well done.

Jack Darrow,
3847 N. Francisco Ave.,
Chicago, Ill.

● Yes, your letter says what others say, and you'll get serials, and you'll get good ones. We're considering a few right now which we feel will fit in very nicely, and keep up the standard of top-notch material in AMAZING STORIES. Your remarks on the authors you like are quite definite and we appreciate your ideas on the subject.

Outdoor scenes? Our next cover will be an outdoor scene. And it's by Fuqua again. Krupa will do a cover, more than one, for us in the near future, we promise. He'll be coming at you next month with another back cover.—Ed.

ADDED TO CLASSICS

Sirs:

The December issue is the peak of your efforts since the first issue in June. If you keep this excellent standard during 1939, I'll be well satisfied.

To my list of classics I have added "Ghost of Mars." This story held my interest with its splendid characterizations and plot. Earl Vincent's

yarn is second in my estimation, with Binder's "Master of Telepathy" tying. Beside the excellent idea and writing, the ending was outstanding.

Ask Mr. Jones if we can't have another Professor Jameson adventure.

Sam Farnpolsky,
240 Austin Street,
Winnipeg, Man., Canada

● No sooner said than done. We've written Mr. Jones and requested the immediate presence of the estimable Jameson. You've voiced the requests of very many other readers. So watch for the latest Jameson story in AMAZING. We'll rush it to you as soon as possible.—Ed.

SWELL-FLAW-PAUL

Sirs:

Just got the Dec. AMAZING, and it's swell. In first place, "Ghost of Mars" and "Master of Telepathy." Second place "Purge of the Dead" and "Kiss of Death."

A flaw I found in "Ghost of Mars" is that where as Prof. Winterton says that the Martians would be blinded if they came to the surface of Mars, the author has a Martian come to the surface and look upon the ruins of the Martian city. Now how could the Martian see the city if he became blind upon being in the sunlight?

We don't want Paul. Fuqua and Krupa are better than Paul ever was.

Herb R. Grossberg,
1368 Coney Island Ave.,
Brooklyn, N. Y.

● In "Ghost of Mars" the Martian and the hero came up in the early dawn, when "the sun's rays were just beginning to slant through the walls." The Martian wasn't out in full sunlight, and the editors don't think that Winterton meant they would go blind, but merely be "blinded" by the brilliance.—Ed.

CONTRADICTIONARY

Sirs:

Like most readers, I have never written to your magazine because like the majority I have been perfectly satisfied. I write this time not to throw anything but to ask a favor. In all science stories there are points of great interest to me at least, but taken as a whole, they are contradictory. As in your "Ghost of Mars," we have a Martian 30 feet tall and big to boot. I seem to remember other stories where he was quite puny. In still

a third he was a direct relative of man. In a fourth there were nothing like man as intelligent life. In a fifth there was no animal life at all as we understand the term.

So, Mr. Editor, just to satisfy my curiosity, how about a series of articles on the planets, describing each body as it actually is, and what forms of life there would probably be.

Even if you don't, I still appreciate your magazine and I have yet to find a story I didn't like, or some part of it.

B Ward,
386 Regent St.,
London, Ontario, Can.

● Naturally, it does seem a little confusing to see your mental picture of the inhabitants of another planet rudely made over by another author, but even scientists can do little more than use their imagination in reconstructing the probable life from the meagre information they glean from their telescopes, spectroscopes, and cameras. Thus, since it is impossible to set a standard, nor is it desirable, we will have to take each author's imaginative presentation as just as good as the other's and let it go at that. Certainly we can pick out no single one and say "He is right!" As for an article as you describe, I repeat that science itself does not possess the information you desire. Theory and imagination, yes, but not even probable fact.—Ed.

FAMILIAR NAMES

Sirs:

As an old-time contributor of "Discussions" and also as a former author-contributor ("Radicalite" and "Stellarite" in the January and March, 1933, issues, respectively), once again I feel impelled to join the gang for a good old free-side rag-chew! It's been a long time since my last (same being some time during the summer of 1913 while I was in the Canal Zone), but I don't think I've gotten too rusty. So here goes!

In company with the rest of the bunch of familiar names that are beginning to emerge in "Discussions," the two biggest criteria of progress are the fact that you've regained so many of the old masters of science fiction and the reappearance of favorable comment in "Discussions." Among names pleasantly reminiscent to me are Milton A. Rothman, Donald A. Wollheim, Bob Tucker, and Jack Darrow. But where is Forest J. Ackerman? Is he hiding somewhere out in the "bondocks?" Or can it be that he has quit reading science fiction? Heaven forbid!

One item I'd like to get clear in my mind. Jules Verne was the first author I know of to state that the necessary escape velocity from the Earth's gravitational field is seven miles per second, and every one has stuck to that theme ever since. In his classic tale, "From the Earth to the Moon and a Journey Around It" he made use of a projectile fired from a giant cannon sunk vertically into the ground. Necessarily the initial velocity imparted to this projectile was its only impetus, and this velocity had to be of that order

to overcome the mathematically-calculated drag. This would, of course, apply to any space ship whose propulsive force was limited to a firing device left behind on the Earth's surface.

But why should this follow when the propelling mechanism is self-contained, as in a rocket ship? Rifle bullets, shells from artillery weapons, 4th of July or signal rockets, Dr. Goddard's experimental rockets, and even motor-driven aircraft take off with infinitely lower velocities. It seems to me that if these well-known objects can rise from the ground, all that is necessary to take them clear out into space and anywhere that fancy dictates is a sufficient supply of reaction fuel. Granted that this fuel is not as yet developed, and that it may or may not be as time goes on. Continuing on these premises, however, if persistent research should produce such a propellant the pilots of future rocket-driven ships will be able to take them off at a speed entirely comfortable to their passengers rather than with the bone-crushing shock so frequently depicted by the average science fiction author.

In the October issue you printed a story called "Horror's Head," by Lieutenant John Pease, a literary libel if ever there was one! I hold no brief for Communism, in this country or out of it, but Russia is a nation with which the United States is not only on friendly diplomatic terms but is enjoying a very lucrative commerce as well. To so crudely depict the activities of the scientists and physiologists of the Moscow Brain Institute, presided over at the original time of publication of Walter Duranty's "Times" letter by Dr. Pavlov, a man who, although at an advanced age, was world-famous, is not only a very poor effort at "pseudo politics" but is distinctly out of place for an officer of the United States Army. If such brain storms are his idea of the conditions existing in Russia he should at least have the grace to leave off his title of military rank. To my mind he should be disciplined for it, and I speak as an officer of the Officers' Reserve Corps of the Army.

Richard Rush Murray,
(2nd Lieut., Infantry Reserve),
157 William St.,
Catskill, N. Y.

● Jules Verne got his information from the Royal Astronomical Society before he began writing his famous story. And the proper wording is: "initial velocity of 7 miles per second to escape earth gravity." Certainly a space ship using a gradual increase in speed could escape the earth. An ordinary roman candle would go off into space if its powder kept exploding long enough. But for a single shot attempt, the velocity would need to be the 7 miles per second indicated by Verne.—Ed.

WHAT IT TAKES

Sirs:

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steadily. I'm glad to see that Harl Vincent is back. His story, "Prince Deru Returns," had the atmosphere of the old time stories by Vincent. "The Kiss of Death" by Neil R. Jones was another very good yarn.

Your cover, though good from an artistic standpoint, is still very bad for a science fiction magazine. Too much horror type. The back cover on the other hand is really worth while. That space ship by KRUPA was a honey. You should try KRUPA on the front cover once in a while.

Your interior illustrations are excellent. Your two new artists have what it takes. Each drawing is a masterpiece.

James V. Tourail,
137-07 32nd Avenue,
Flushing, New York.

COVERS

Sirs:

Concerning the December cover, of which you are so proud, I must say that I don't like it, and don't think the average newsstand-scanner would like it. It's dark, for one thing, but that's a small matter; dark space scenes are usually excellent. But here you have, as the dominating figure, a very repulsive-looking monster. An utterly alien creature wouldn't be so bad, but this is obviously a man, but a very unattractive man. Now, I don't want the covers adorned with doll-faced heroes, but neither should the facial features—and body as well—border on the disgusting—like and yet unlike humans, an ugly caricature.

I'd like to see a color photograph again, dressed up better. The movies can sustain fantastic effects for long periods of time, while the characters are actually moving. Surely a still shot could be worked up in fitting form.

John A. Bristol,
5134 Condit Road,
Washington, D. C.

ANOTHER NEW DISCUSSIONITE

Sirs:

First I wish to say that I have never written to this or any other magazine in regard to its stories, artists, or make-up; but after reading the different comments and opinions of some of your correspondents I have become imbued with the desire to "air" some opinions of my own.

The artists—in my opinion, the so called artist Paul could not illustrate a story even if he had been able to draw, something of which I have yet to be convinced. His illustration of any one story could have been switched to and used in any other and conveyed as much meaning.

J. S. Krupa on the other hand, while not an Alexander Raymond, always conveys a feeling of relationship, good detail, and plausible appearance to the story.

The stories—I read them for relaxation, enjoyment and because they are different. I am not interested in their scientific exactness so long as they do not overstep the bounds of common knowledge or sense of plausibility. I expect characters who behave like human beings, whose in-

minets and desires are normal and convincing.

I wish to express the hope that you do not deprive me and the thousands of others who I am sure feel as I do, of your magazine by printing these—stories that end with some "Bird" about to be stuck in the "gizzard" and continued next month.

Theodore H. Crouch,
2816 W. Mulberry St.,
Baltimore, Md.

CRITICISM DELETED

Sirs:

About that letter of mine which appeared in the Nov. number. I noticed that my criticism of every author and every story was deleted, with the exception of Weinbaum and "Rev. of 1950" and that fact worries me. Why? Well, because I wonder what the motive was; when a magazine cuts out kicks against stories, it's not so hot. I realize that I was, perhaps, needlessly severe, but the principle is still there. At any rate, the last paragraph sounds silly with the letter as printed . . . people will think I'm screwy . . . 'cryin' out Hamilton!, tell 'em I thought the magazine wasn't (it's improved, really) so hot, and that the aforementioned paragraph was apropos to the rest of the letter.

I thought "Horror's Head" to be much better than fifth; third, perhaps . . . only I've read very similar stories. Lastly, please do get "New Adam" . . . good lord, it's precisely the type of thing science-fiction should exist for . . . to create discussion (not disension, though), to show the flaws in modern social structure . . . and by all I've heard, "New Adam" will do all that and much more. You simply must do it! And I'd suggest publication of one of Taine's stories, too. "Tomorrow" sounds best to me.

And please try to get something by Merritt . . . if he wants more money, then his stories are worth it . . . even get a reprint . . . "The Metal Monster" or (heavenly thought!) "The Moon Pool." Till next month . . .

Jack Chapman Minko,
5000 Train Ave.,
Cleveland, Ohio.

● We get perhaps 75 letters listing each story as you do, and naturally, we can't print each one, or even two, on that order. It would be a dreary thing for you to read a discussions column with endless repetition of how each reader liked each story. We pick a letter whose tone is nearest the general consensus and print that and that only. Therefore your letter was deleted, except where there was some remark not brought out by someone else.

We keep a chart with a record of how each story is rated by the readers, and then each story is placed in order of popularity. An adverse opinion is a mark against a story, and a good opinion is a mark in its favor. Is this perfectly clear? We certainly do not want you to consider that we delete criticism. You'll note quite a few letters whose complimentary passages have been deleted, leaving only the kicks. This way, we cover the whole gamut of discussions.

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"I told you I'd get them soon as possible."

"Which isn't soon enough, old cabbage! Second: we would like to see large format, again. At least, I would. Then, I wonder where, oh where, the quarterly has gone? And, if you won't give us large format, how about 160 pages or even more in the present size?"

"Don't want much, do you?"

"Well, I believe that while I'm wishing and asking I might just as well go the whole dog, you know!"

Ye Ed grins. Bring a fan himself he knows how the visitor feels.

"And—why didn't we get a serial this month?"

"Didn't I do anything right?"

"Sure, you gave us a monthly again. You gave us the date line on the back. You gave us 'Ghost of Mars,' 'Master of Telepathy,' 'Purge of the Dead,' 'Prince Deru Returns' and 'Kiss of Death' in the present issue. For that I'm truly thankful."

"Thank you!"

"And say—while you're at it, when you change the cut for the editor's page, why not see if it isn't possible to get a better cut for the top of the contents page. The present one stinks!"

"Err, we'll see what we can do!"

"Thank you, and now I'll say good bye. And here's a good Canadian cigar for your pains. And oh yes, why do some people say in the magazine they want penpals and then won't answer a fellow when he writes? I wrote a certain young lady, so did a friend of mine and she answered neither. Yes, Miss Vivian Metherall, of Vancouver, I MEAN YOU!"

Leslie A. Crouck,
41 Waukeech Street,
Perry Sound, Ont.,
Canada.

● Been looking all over the place, but I can't find that good Canadian cigar nowhere, dang it! Are you sure you enclosed it? Kinda think I need a cigar to chew on while I digest that letter.—Ye Ed.

The final result of opinion on the stories in our November issue places the stories in the following order of merit.

1. "Secret of the Ring," by Thornton Ayre.
2. "Revolution of 1950," by Stanley G. Weinbaum.
3. "Ray of Eternity," by Richard Tooker;
- "Song of Death," by Ed Earl Repp; "Monstrosity of Evolution," by Thorp McClusky. (To date, no further votes have come in to break this rather amazing three-way tie for third place.)
6. "The Man Who Lived Twice," by Edmond Hamilton; "Pirates of Eros," by Frederic Arnold Kummer, Jr. (Still another tie, which couldn't be broken.)

The only conclusion we can draw from the peculiar results in this month's voting is that most of the stories were about equally liked by the readers on the whole.

SERIOUS?

Sirs:

I had almost given up all hope of seeing the return to a monthly. The whole mag is very nicely made up. I would like to see the original comet-tail heading restored. After seeing it for 13 years I rather miss it. The back cover is a most original idea, although your photo covers were rather melodramatic. The work of Krupa and Fuqua rivals that of Paul. Have Paul do an occasional cover or story.

All the stories were very good except "Monstrosity of Evolution" which, while well written had an old plot. Keep down the sex interest and don't let any more "Meteor Monsters" creep in. That old world-destruction-by-monsters plot needs to be covered up with a six-foot blanket of earth.

A book-length serial would be welcome. Do all the stories have to be so serious? A good burlesque or satire would be appreciated. I think that if a diligent search were made the doings of a really scientific detective could be brought to light and edited for all to read. Just one more thing. When does the quarterly come out?

S. S. Sowers,
4115 E. Slacum,
Maywood, Calif.

● Good burlesque and satire is not written every day. Especially in science fiction. Our readers don't like to see their science made the object of satirical burlesque. You see, they have faith in future science. Satire is good, when it is correctly handled, and on a proper subject. Stanton A. Coblentz has done many good satire pieces, and perhaps he will do more.—Ed.

AN AUTHOR SPEAKS

Sirs:

Just read the latest issue of AMAZING, and liked very much the make-up and illustration for my yarn. The back-cover feature is one of the best ideas on any s-f magazine yet. The whole magazine seems to have improved by leaps and bounds in the last few months. More power to you.

Edmond Hamilton.

REVISION OR CHANGES

Sirs:

It improves. Perhaps yet you will allow the authors to write their own quaint tales in their own quaint way. WHEN YOU TAKE THAT LINE, "ANY COPY ACCEPTED IS SUBJECT TO REVISION OR CHANGES TO MEET THE REQUIREMENTS OF THIS PUBLICATION," OUT OF YOUR MAGAZINE, THEN, AND THEN ONLY, WILL IT BEGIN TO BE A GOOD PUBLICATION.

However, it has improved. You have ceased, evidently, to insist on a forced love interest. That is fine. Love interest is O.K. in stories so long as it is not dragged in by the heels.

Don't cut the "Correspondence Corner." Letters from the readers are interesting, sometimes more interesting than the stories.

The only story in the November issue that is anywhere near good is "The Man Who Lived Twice" by Edmond Hamilton, who is an old-timer in the field.

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To conclude, let the authors write their own stories, knock off the footnotes as much as possible, have two serials, and then keep up the good work. I have hopes for you.

Allen Ingold Benson,
Box 17, U. S. S. California,
Bremerton, Washington.

● You may have noted that our readers clamored for elimination of sex from AMAZING STORIES? This, therefore, becomes part of our policy. Now, when we refer to editing and changing a manuscript, it is editing and changing of this type that is done. Sexy passages are eliminated. When very much revision is necessary, we return the manuscript to the author. However, it would be a serious waste of time to return a manuscript simply for a few minor changes, and changes that would not be made correctly since the author doesn't sometimes grasp just how much editing the manuscript needs. No author objects to his work being edited in this manner. In fact, if a scientific error, or a grammatical fault is weeded out, the author is protected from criticism by the reader. You infer that we change the story. Well, sometimes we do, when a climax falls flat, it is pepped up, or if a thread is left unexplained, it is inserted. But we do not change the story for the worse.—Ed.

NO ERRORS

Sirs:

Congratulations. My researches found no errors in the December Science Quiz.

But being a contrary scuse, I would suggest gently that Mr. Earl Vincent might agree with me in expecting the rocket on the back cover to be woefully inefficient. To achieve the exhaust velocity and consequent power inherent in the fuel the rocket should have a largish expanding section like a megaphone on its rear end. *Contracras,*

New York City.

● Thanks much for your letter. But why not let us know who you really are? Our other readers want full names and addresses, and do you think it's quite fair to them to neglect signing your name? In the future we will adopt a policy of including only letters which are signed, especially if they are controversial, or highly opinionated.—Ed.

HUMAN INTEREST ANGLE

Sirs:

Congrats on another superb issue. Congrats on another smashing back-cover, but . . . that front cover! Phew . . . It was lousy in my estimation. In my estimation, mind you, and not any one else's. You have a grand artist in Fuqua, but the December issue doesn't live up to his past triumphs at all. I believe that Krupa has it all over Fuqua when it comes to interior work. His illustration for *Kiss of Death* is the best yet. "*Kiss of Death*," by the way, was the best of the issue. "*Ghost of Mars*" and "*Master of Telepathy*" were next best. Glad to see Eando Binder on your list.

I also put in a cry for smooth edges . . . It adds so much to the beauty and value of the mag. Another thing. I would like to see some more Weinbaum classics. They are really rich. And how

about smearing a Paul Illustration around now and then if possible?

Your human interest angle is very good. Keep it up. Also enlarge your discussions department, perhaps putting up a small reward for the most interesting and suggestive letter. As a final thought, "Monstrosity of Evolution" was the best November story, and your Questions and Answers fine in this issue.

Joe Fortier,
1836—39th Avenue,
Oakland, California.

● We are carrying a large Discussions department this month, as you will note, and although this will vary from time to time, depending on the space remaining after selection of stories for the issue, we will endeavor to maintain a large section, which as you say is "interesting." Thank you for your comment on our Human Interest. We think it is one of the finest features of our magazine. Every man loves a good story.—Ed.

THORNTON AYRE SPEAKS

Sirs:

I feel I must say how much I liked the truly brilliant main illustration to "Secret of the Ring." The three men and the girl on the floor, together with the intricate machines, was a masterpiece! Great work—congratulate your artist for me, will you? I liked too, the perspective which was embodied in the illustration to "Locked City."

I don't suppose you object to my making a few observations on AMAZING? Not as an author, but as a reader. Since this is the first time I've written you since getting stuff taken by you I might as well seize my opportunity. . . . AMAZING at first had certainly got plenty of hard spots in it; but today, especially the November number, it ranks tops. Definitely, I believe that it will give any of the others a run for their money (and I don't say that because you've taken my stuff but because I really believe it). That human element has been really brought to life by your policy; nor is there any of the objectionable theatrical sensationalism. These are darn good yarns of the more "thick ear" type. . . . But for humanity and depth AMAZING always stood first, even under Doc Sloane. Now Ziff-Davis are on the job nothing could be desired—except twice a month!

Thornton Ayre,
Blackpool, Lanc., England.

● Thanks, Mr. Ayre, for your valued opinions. However, we don't quite get what you mean by "thick ear." Are we right in translating this to mean "sincerity"?—Ed.

THE ROCKET SHIP

Sirs:

I have a few remarks to make on the subject of Mr. Krupa's rocket ship. His ideas are good, superficially, but they show a considerable shortage of knowledge on the fundamentals of the question. For instance. The fuel must either be, by definition, a normal combustion fuel (utilizing molecular energy of some sort) or atomic fuel,

utilizing atomic power. If it is the former, no conceivable chemical reaction can produce enough energy to make a load carrying interplanetary rocket practicable. Something like 96 per cent of the thing would have to be fuel, even using atomic hydrogen (which no one has ever been able to store). You might be able to carry a pilot and a little air, but that's about all. If it is the latter, using atomic energy, the problem is entirely different. Then, only a few per cent—no more than ten at the maximum conceivable—of the mass of the ship would have to be fuel, and you could use acceleration, positive or negative, all the time, and never have to coast under zero acceleration. Then, the trick rotor method of getting gravity for the passengers would be superfluous. The rocket could always accelerate at one g or at times a little less, and up would always be forward. The thing would head out from earth nose first, and settle down at its destination tail first.

Besides being superfluous the passenger rotor would be positively dangerous. When it was revolved, by a motor or otherwise, there would be a reverse torque on the body of the ship, and nothing at all to prevent it from turning in the opposite direction. Next, if you fired a steering rocket, the gyroscopic effect of the revolving rotor would produce the most peculiar reactions and gyroscopic precessions that you could possibly imagine. In fact, it would be almost impossible to turn the thing in frictionless space without going completely out of control. For steering, it would be much simpler to have a set of three gyroscopes in the center of gravity of the ship, revolving rigidly oriented in space, and to swing the ship around these gyros. And then you could use the main jets to do everything. It would produce a much simpler and lighter installation, much easier to control.

Another thing. You only need a velocity of 7 miles per second at the earth's surface, if you want to escape from the planet in one fell swoop. That's what a cannon projector would need to send a shell from here to infinity. But a rocket, given unlimited power (such as atomic) need never approach that velocity. It can pull away from Earth as slowly as desirable. However, I see that the above is implied in your article accompanying the picture.

The other features of the ship are more or less minor, and a good many of the problems, such as air conditioning) have already been worked out, particularly for submarine work.

In space, forward, of course, is an arbitrary designation, depending on where you are counting from. Normally, in flying from Earth to Mars, for instance, at opposition, you would accelerate half way at about one g, swing the ship around, and decelerate the other half of the way. The acceleration would vary some, of course, in landing and taking off, but would always have to be at least a little more than the g of the planet involved. I figured the other day, that with an effective acceleration and deceleration of one g, you could make the Earth-Mars trip at opposition in about a month. Perhaps a little less, but

it was in that order of magnitude.

Many's the time I've objected violently to a fictional rocket ship which moved forward, like a torpedo, and not up, like an elevator. But the authors still seem to insist on putting the decks parallel with the sides of the hull. Apparently their characters are human flies.

*Dr. John D. Clark,
3809 Spruce St.,
Philadelphia, Pa.*

● What about it, readers? Do you agree about this new "elevator" type of ship? Your editor is inclined to think Dr. Clark has something there.—Ed.

THE SCIENCE FICTION CONVENTION

Sirs:

The December issue of *AMAZING STORIES* hit the stands a week or so back, but this is the first opportunity I have had to write. The chief reason for my writing is the request of Mr. Dancy in your last issue for more information on the proposed "World Science Fiction Convention." Well, it just so happens that I am in a position to give complete information upon that project inasmuch as I am one of a group of fans running a fan organization known as "NEW FANDOM" which has pledged itself to produce the "World Science Fiction Convention."

The World Science Fiction Convention will be held the Summer of 1939 in conjunction with the World Fair. The definite date and address of the convention have not, as yet been decided upon. We plan or rather hope to have in the vicinity of 1,000 editors, authors, fans and science-fiction readers present. (If you will recall the same group behind this convention recently sponsored "The First National Science Fiction Convention" in Newark which is the most successful convention of its kind ever presented.) We have promises from *EVERY* science fiction editor that we shall receive full co-operation in advertising the convention and in their attending. A great number of authors have also vowed to help in any way possible. I might mention as a few, John W. Campbell, Jr., Eando Binder, Manly Wade Wellman, Most Weisinger, Leo Margulies, Frank B. Long, Jr., Otis Adelbert Kline.

Of necessity there has to be an organization backing this great event. That organization is the above-mentioned NEW FANDOM. NEW FANDOM represents the *ENTIRE* fan field. Every science fiction fan group of any importance whatsoever have united as one behind NEW FANDOM their focal point, with the one purpose in mind of producing in the most successful possible fashion the "World Science Fiction Convention."

Our organ has published articles by such authors as John W. Campbell, Jr., John D. Clark, Ph. D., Eando Binder and many other scientificists of note. If you are interested in attending the "World Science Fiction Convention," simply drop a letter to the address below for further information. If you desire a copy of our club magazine

enclose 10 cents to help cover its cost.

While I'm at it, I might mention the fact that you need only one story an issue the grade of "Locked City," "Secret of the Ring," "Revolution of 1950" and "The Ghost of Mars" to keep this reader satisfied. Please include my vote, and in this I think I follow the views of every member of NEW FANDOM, for the printing of "NEW ADAM," John Taine's novels, Paul illustrations, and smooth edges.

*Sam Moskowitz,
693 So. 11th St.,
Newark, N. J.*

● There you are, Mr. Dancy, and all the others interested in the Science Fiction Convention. Mr. Moskowitz can supply you with all information, and needs your help to make the convention a success.—Ed.

FROM ENGLAND

Sirs:

I must say right away that I had a shock when I saw the June issue . . . my first reaction was: "Hullo, *Amazing's* going to pull up its socks at last! Well it has done just that already . . . if not more!

Mind you, this letter is not going to be all bouquets . . . far from it, I have one or two real large size brickbats to hand you right away! . . . Okay, let's go!

Firstly, the lay out and make up of the mag is very nice, and a vast improvement on the old one. The photographic cover is a new idea in science fiction, but I think it is only a question of time before you come back to painted covers . . . the scope is so much larger . . . by the way, I did not care for your first cover, it had nothing of science fiction in it and could have much better graced an "Adventure" Mag.

The astronomical chart on the back cover was a winner all the way, a very fine piece of work, and a credit both to the artist and the editor, but why print it on the outside of the cover? Why not sell the outside back cover to "Camel's" or somebody and put the McCauley inside the back?

I like the following: "Meet the Authors" (why not photos?) "The Observatory," "Discussions," "Science Quiz" (Tough, Huh!), "True or False Test," "Questions and Answers," "Correspondence Corner."

I don't like: "Stories which are VERY far fetched. Your artists (why not Paul). Rough edges."

The name "Amazing Stories" should include much more than it does . . . any story which is strange or weird or bizarre should find a place in it, not only science fiction.

Many readers will, I think, protest against the use of tales which are not science fiction in the accepted sense, but didn't Lovecraft and C. A. Smith, and even Weinbaum, write some tales which refuse classification?

Watch author Fearn, he can do good stuff, but he is very fond of going beyond the bounds of

probability or reason . . . you know, mad scientists moving planets in space, etc.!!!!

I should like to see in your pages, authors: KELLER, Smith, Moser, Campbell, Scher, Wandrei, Wellman, McClary, Farley, Hamilton, Merritt, and Benyon.

I should like to see the illustrations smaller, more subdued, with more detail work in them.

Don't forget we are not all kids who read science fiction, some of us are thirtyish even and beyond!

In conclusion I want to thank you for listening, and remember you ASKED for letters, so don't kick when you receive one which does not agree with everything you do. My best wishes for your success in this peculiar and limited field of fantasy. I have an idea that we shall hear a great deal about "Amazing Stories" in the future, and that it will, under the present organization, rise once again to be the Aristocrat of Science Fiction.

Herbert Vincent Ross,

71 Harley St., London, W. 1, England.

● This letter from one of our English readers is very interesting, and brings out a few points our American readers have forgotten. It is true that the title AMAZING should mean something other than just science. And we are going to try to keep that in mind in presenting stories to you. There will be fantasy, and other amazing types of stories presented from time to time, in keeping with the title AMAZING STORIES.

Your comments are quite complete and very enlightening. We are glad to note you approve of our magazine.—Ed.

FROM ALASKA

Sirs:

May a service man in the Alaskan Territory contribute a letter? I am an ardent reader of your magazine. Occasionally I try my hand at science fiction writing, more for my own amusement.

After having read your November issue, I put "The Secret of the Ring" first, as being a truly science fiction tale. "Pirates of Eros," I found to my dislike. In connection with the plot of this story, I'd like to ask if heat would have any effect in a near vacuum?

I am inclined to agree with Mr. Bob Johnson as to the keeping of propaganda out of our Magazine. Nuß Sed.

Joseph Makely,

D. M. C., Haines, Alaska.

● Heat would not be transmitted in a vacuum, but possibly in a near vacuum, but it would be a very slow process. However, it would still transmit itself with equal facility along a metal rod, air or no air.

Many thanks for letting us hear from an Alaskan reader.—Ed.

SERIALS

Sirs:

In the Observatory of the November issue of AMAZING STORIES, you asked for opinions concern-

ing the length of stories in future issues. I prefer completed stories even if there would be only one story to an issue, and at the most, not over a two-part story.

C. M. Brets,

Maple and Ash Sts., Progress, Pa.

SHORT AND SWEET

Sirs:

Here's something short and sweet. Keep up the educational back covers. Get anything and everything by Weinbaum. Keep the cut for the Observatory. Keep Fuqua and Krupa. Make the covers less sensational. Trim the edges if possible. Have two serials, one new story, and one reprint of an old classic. ABOVE ALL, KEEP UP THE GOOD WORK!

Arthur Kuzerman,

395 Cross Street, Malden, Mass.

BEST EVER PRINTED

Sirs:

I thought Festus Pragnell's "Ghost of Mars" the best story AMAZING has ever printed since coming under your new regime. The characterization was vividly real, the picture of social conditions sound, and the ending was as effective as any I have ever come across. The "happy ending" is not always the best.

"Master of Telepathy" was prolific Binder's best since "Blue Beam of Pestilence," and was almost as good as "Ghost of Mars."

But there were a few disappointing tales as well. Two, especially, I did not like at all and these were "Prince Deru Returns" by Earl Vincent and "Kiss of Death" by Neil R. Jones. The first is an example of the blood and thunder story which I think it is about time science fiction outgrew.

The Jones yarn was a great disappointment for he is one of my favorites. There are few stories I liked better than the Jameson series. (By the way, do you intend printing a few more of these?) However, you cannot please every one so perhaps there were others who liked these stories as much as I disliked them.

I. Asimov,

174 Windsor Pl., Brooklyn, N. Y.

ATOP THE WORLD

Sirs:

I liked the kind of stories as published in the Oct. and Nov. issues. Keep up the good quality of your Authors and you'll soon be sitting atop the world. I have been reading AS for only about 7 months, and already have noted the improvement in the presentation of the stories. Previous to time I tendered a dollar for trial subscription I had not thought STF Mags worth paying out good money; but these six issues have switched me to your side of the field.

"Ray of Eternity," by Richard Tooker, sure packs a powerful punch. I know it bowled me over. The Action flows so smoothly that one lives and feels the evil forces behind that Ray!

"The Man Who Lived Twice," by Edmond Hamilton, is most entertainingly presented. I think it is entirely logical that it's possible certain forces will try to gain power such as Hamilton portrays.

Bring on your new authors to the firing line, and test their mettle! The new ones so far, are good!

I'd like to see the AS on the same format as Popular Aviation, Radio News, and Radio-Television Mags, with straight cut edges and heavier covers than formerly.

*Miss Esther Geraldine Creudson,
2413-9th Avenue, Kearney, Nebraska.*

SUDDEN JUMP FROM OBSCURITY

Sirs:

I might as well splurge myself in admiration at AMAZING's sudden jump from third rate obscurity. First we have a change of address and a change of publishers. Then a change of editor, a decrease in price and bulkiness, and a new type of cover. More recently AMAZING becomes a monthly. As these changes took place the quality and quantity of the contents increased. Truly

amazing has the advance of your magazine been in the short year I have read it.

I wish to tell you I approve of your return to painted covers. While photographed covers are a novel and interesting subject, the fine detail and alien material can not be expressed in the catch-all eye of the camera.

Having heard a great deal of the immortal Weinbaum, I perused the "Revolution of 1950" critically but must admit he had a story there. I liked the other stories too, but then I'm a sucker for science fiction and am in no condition to criticize, so will leave that unpleasant and dangerous employment to others better suited.

After showing my ignorance and no doubt taken up someone's valuable time with my chatter I will stop with the dismal thought that as AMAZING has so bettered herself right out of chance to keep bettering herself by becoming better all at once. Or should I have said that last? It probably shows my mental illumination too well. However, if ye editor sees any chances to stop AMAZING up let him have at it.

*N. Willmork,
Chelan, Washington.*

WANTED: 7 FEARLESS ENGINEERS!

Into the unknown they went, these seven engineers and their wives, destined to mind the machines of a mighty civilization. The lives of a whole people depended on them. But where were they going? What was behind all the mystery as they departed for an uncharted island? Why had seven engineers been necessary? The most amazing engineering tale ever presented in any science fiction magazine! Don't Fail to Read Warner Van Lorne's Amazing Masterpiece of Science Fiction!

VALLEY OF LOST SOULS—by Eando Binder

A strange hlee gas filled this sealed valley, and beneath its undisturbed calm lay an engessable mystery. Twenty years before, Allan Rend's father had vanished in its depths, and now he and Tam Corwood were determined to solve the mystery. Dynamiting the wall to release the gas, they made a stunning discovery

LOST ON THE SEA BOTTOM

by Ed Earl Repp

A strange story of a waled silver river deep beneath the sea, five miles down!

THE PHANTOM ENEMY

by Morris J. Steele

From beyond the spaceship's hull came a terrifying whispering, and with it came madness. What amazing thing lurked in the void, seeking their lives?

THE WORLD THAT DISSOLVED

by Polton Cross

Deep in space a nova flamed, and plunging across the void came uncanny radiations, to dissolve the planetoid.

THE LIGHT THAT KILLS

by J. Harvey Haggard

Into Lithuania poured the Polish troops, and nothing could stop them. War in all its horror ravaged the country. Only the sunlight could save them, and cruel clouds intervened.

AND THESE FASCINATING ARTICLES

The Observatory

Voice of the editor

Meet the Authors

They write our stories

Riddles of Science

The lost city of Angkor

Discussions

Voice of the reader

Science Quiz

A test of knowledge

Ocean Liner of the Future

Back cover feature in color

ALL IN THE BIG FEBRUARY ISSUE OF

AMAZING STORIES

ON SALE AT
ALL NEWSSTANDS
DECEMBER 9

FUTURE ROCKET TRAIN

By H. W. MacCAULEY

On our back cover this month, artist MacCauley has created a magnetic rocket train, floating freely between its magnetic rails, and powered by rocket motors, capable of speeds up to 500 miles per hour. Far fetched, you say? Modern science does not think so.

Recently, Westinghouse Research Laboratories gave a demonstration of a new type of magnet. This new creation has the unusual characteristic of floating in air when prepared in the form of two magnets with like poles opposed. The secret of this new magnetic invention is the amazing property of a new type of steel known as cobalt steel to become highly and permanently magnetized far beyond all previous magnetic metals.

In this particular demonstration, Westinghouse experts caused a magnetic cobalt ring to suspend itself over a magnetic base. These two ring-shaped magnets were placed in a framework, one above the other. The lower magnet was enclosed in the base of the framework. The upper magnet, free to move up and down a celluloid guide, floated at rest about an inch above the base. When disturbed by a slight push, the upper magnet bobbed up and down like a cork in choppy water, slowly coming to rest in its original position. Gravity is thus overcome by a magnetic force equal to its downward pull.

Starting from this assumption, the artist has created a rocket train made of cobalt steel, suspended by magnetic repulsion between cobalt rails and rings of the same repulsion. That is, like poles of the ship and rails are placed in opposition, so as to suspend the ship between.

It is reasonable to believe that such a thing can be accomplished. Certainly, there are many other points to consider. What about the sway of the train, you say? Will not the least deviation throw the car aside, and cause it to wreck itself against the rails, or even smash them and plunge out of its confines to the ground below?

Certainly the ship will sway. But just as this tiny Westinghouse magnet bobs back and resists with correspondingly greater force any effort to contact it with the other magnet as it is forced nearer, so would the ship compensate its swing. The problem here is a mechanical one of allowing sufficient clearance to allow for sway.

Turning, making curves, you say, would be impossible. It isn't too far-fetched to conceive of turns being made in a specially built system of rails, which would possess already revolving wheels rotating at a set speed to conform with the speed of the train, which would momentarily transform the car into theoretically a land car once more, until the turn was made.

Aha, you say, what about the great amount of electrical current generated by the passage of the ship, itself a magnetic field, through another magnetic field caused by the rails? Fine! Now we have all our other power problems solved.

We have lights, heaters, and everything else aboard the cars operated by electric power generated by the magnetic fields themselves. Surplus power might be grounded by contacts placed at regular intervals, just as static electricity is discharged from cars coming over large bridges by means of a small wire erected in the ground at the end of the bridge. And too, the machinery necessary in our enclosed turns would be powered by that same source. Imagine a train that makes its own power!

If you have read the story by Stanton A. Coblentz in this issue, "Death in the Subway," you will be interested to note that the author has bit upon practically the same idea, but he has enclosed his entire mechanism in a tube, and created a vacuum inside. Theoretically, this car would be capable of greater speeds, since air-friction would be eliminated, but our contention is that the cost of such a system would be so vastly greater than the magnetic train MacCauley has conceived that it would be much less desirable. However, cost is a relative factor, and in the future, it may not exist as a barrier to construction. Perhaps our readers have opinions to offer?

Our readers are already familiar with the theory of rocket propulsion motors, and little need be said of the possibilities contained therein. This train could be powered by rockets which would build up its speed to maximum, and thereafter, the ship could coast for dozens of miles, with only occasional bursts of the rockets to maintain its speed. Due to the absence of all material friction beyond that of the air itself, the ship would glide along vastly smoother than any system of modern friction elimination would allow. Streamlining of the train would be as perfect as possible, the whole being formed like a projectile in the shape of an elongated teardrop, most perfect of streamline designs.

The train can be easily halted by its forward rocket tube, and also by mechanical braking devices constructed much as are the turning stations, with systems of rotating wheels contacting the hull at constantly reduced speed, just as the brake shoes of a modern train grip the wheels and build up terrific friction to halt the train.

Perhaps some day the time will come when it will be possible to travel from New York to San Francisco in less than six hours by a method safer than any mode of travel of today. It would take a major break in the rails to cause a crash, even considering that the magnetic power were to vanish by some mysterious means and allow the ship to drop down. But according to the Westinghouse Research Laboratories, even this would be very unlikely, because cobalt steel, once magnetized, is virtually permanent, and can only be demagnetized by very drastic measures.

Perhaps MacCauley has pointed the finger of prophecy at the future. Who can tell?

ANSWERS TO SCIENCE QUIZ

(Quiz on Page 127)

SCIENCE TEST

1. Graphite.
2. Silver.
3. 300 m.p.h.
4. 5,000.
5. Standard temperature and pressure.
6. Electron.
7. A sound produced when extra high frequency sounds are used.
8. Carbon.
9. Less than that of water.
10. 100° centigrade.
11. Phenolitic volcanic rock.
12. White ants.
13. Hydrogen.
14. Osmium.
15. The empty space at the top of a barometer.

TRUE OR FALSE

False. The moisture of the soil is derived from a deep system of cultivation and plowing in of green crops.

2. True.
3. False. The American Constitution, together with foreign treaties and acts of Congress are the first law of the land.
4. True. It gets moisture from plants on which it feeds.
5. True.
6. True. It will dull the finish.
7. True.
8. False. Birds possess greater keenness and far-sighted vision.
9. True.
10. False. The greatest disaster of which there

is an authentic record is the overflowing of the Hoang-Ho, China, in 1887, in which between 1,500,000 and 7,000,000 Chinese lost their lives.

11. True. Dr. B. S. Hopkins discovered element 61 and so named it.
12. True.
13. False. Two thin garments is best because the layer of air between is a poor conductor of heat.
14. True.
15. True.

STRIKE OUT THE WORD THAT DOES NOT CONFORM

1. Bismuth.
2. Mountain.
3. Variegated.
4. Congregate.
5. Regurgitate.

SCRAMBLED SCIENCE TERMS

1. CHEMIST.
2. VALENCE.
3. COMPOUND.
4. ARGON.
5. BACTERIA.

PROBLEM

Since the hunter faced south, no matter in which direction he turned, he must have been at the North Pole, where all directions are south. The only kind of bear in the polar regions is the Polar Bear. Therefore the color of the bear must have been white, as this is the natural color of the animal.

CORRESPONDENCE AND COLLECTOR'S CORNER

N. Gilbert Dancy, 123 Lancaster Street, Albany, N. Y., wants copies of all published fan magazines. . . . Maurice Jenkinson, 1404 W. 7th St., Muncie Indiana, wants back issues of certain scientific magazines. . . . Paul Rautenberg, 325 Broad Ave., Palisades Park, N. J., would like correspondents from South America, and U.S.A. . . . Cecil Purdy, Cullman, Ala., would like to correspond with AMAZING STORIES readers within 100 miles of Cullman. . . . Robert C. Green, "Hadley," Weston Street, Fairfield, N. S. W., Australia, would like correspondents interested in the two world's fairs of 1939, in time to secure pictures of them. . . . Edgar B. Swager, 413 McBarnes Street, Decatur, Ind., would like to obtain AMAZING STORIES covers from July, 1934, Apr., May, June, July, Aug., October, 1935, Feb., June, Oct., Dec., 1936, Feb., April, June, Aug., Oct., 1937. Who will sell and how much? . . . Hilliard R.

Grossberg, 1365 Coney Island Ave., Brooklyn, N. Y., will swap any recent American science fiction magazine desired, for one of British science fiction. . . . Jenn E. Larsen, 133-37 120th St., South Ozone Park, N. Y., would like penpals from anywhere, foreign or otherwise. Wants them around 17. . . . Russell A. Leadabrand, Box 264A, Route 2, Dinuba, California, wants correspondents in Australia. (Note: Mr. Robert C. Green, here is an answer to you that seems to fit right in. Mr. Leadabrand is a Californian, and you certainly can use this co-incidence to your advantage.) . . . Miss Beatrice Glissenberg, 2358 64th Street, Brooklyn, New York, has read AMAZING STORIES since its inception, and has kept copies of all issues printed, including the quarterlies and Annual. They are in perfect condition, and she wishes to dispose of them to the highest bidder.

How to Run a Big Pay Business From Your Home.

Earnings UP TO \$100.00 In a Week!

This wonderful money-making opportunity is open to both men and women, young and old, experienced or inexperienced, able to give full time or just a few hours a week part time.



Hundreds of men and women who had never had any business experience before in their lives have made fine cash profits with my simple, sure-fire plan. All I ask is a fair chance to show you how you can make up to \$60.00 in a week for full time or up to

\$35.00 on part time; how you can be your own boss; how you can get a brand-new Ford Tudor Sedan or \$500.00 cash as a bonus; and how, in addition to all this, you can get groceries and many other home necessities for your own use at rock-bottom wholesale prices. Let me show you how you can get started without risking a single penny!

YOUR QUESTIONS ANSWERED

I'll try to answer here briefly the questions you may have in mind about this wonderful chance to make good money. Then, I know you'll want to see the coupon below to get the full free details about my unusual offer to you.

FROM ONE SMALL ROOM TO A MILLION DOLLAR PLANT!

First—something about the big, substantial company that is making this offer to you. More than 30 years ago, I started in one small room with a mere handful of nearby dealers. Today this business has grown to a great million dollar plant, and a mighty organization of thousands of dealers located throughout the nation. The free book and other printed matter I'll send you will tell you the complete, fascinating story of the amazing growth of this business, which is due to the sound idea behind it.

BIRTH OF A GREAT IDEA

That idea was simply to supply housewives direct, through authorized local dealers, with daily home necessities such as Coffee, Teas, Spices, Extracts and other grocery products, and also and Laundry Supplies, Home Medicines and Toilet Articles—over 250 products that housewives must buy; and to supply these products factory fresh and in the best quality obtainable. By eliminating costly distribution through many middlemen, these local dealers are able to offer highest quality at attractive prices and will make a fine profit on every order they take. To help dealers enjoy big business and big earnings throughout the year, I furnish them constantly with attractive bargain offers of all kinds for their customers—premiums, one cent sales, free product deals, etc., that simply shut out competition!

\$129.00 in a Week!

With such a splendid, money-making proposition, it is no wonder that Norman Delmer, of Michi-

gan, was able to report clear profits of \$129.00 in one week; that Mrs. H. H. Hoshik, of Nebraska, reported \$31.73 her very first week; that W. J. Way, of Kansas, with us 5 years, reported \$18.10 in one day! For many of my dealers this wonderful opportunity has proved a Godsend! Adolph Bookney, of New York, who had never taken an order in his life, reported \$60.00 in a week, just working evenings! When Hans Corbier, of Nebraska, started with me, he was penniless; 5½ months later he wrote me: "Today I am worth a little more than \$1,200!" These exceptionally fine earnings show your possibilities!

NONE OF THE USUAL EXPENSES.

Think of all the advantages you will enjoy as a local dealer for my line, compared with any wholesaler in your locality. While the profit opportunities are as great, or even greater, you won't have the usual worries and expenses of the storekeeper—such as store rent, clerk hire, light and heat bills, big investments in store fixtures and large stocks of goods. Your home is your headquarters.



NO FINER LINE IN AMERICA

For uniform high-quality, real values and tempting eye appeal, it can be said truthfully that the line of 250 products you will handle stands unsurpassed. On the market for more than 30 years, these products are nationally famous and have millions of loyal users and boosters. You will have delightfully appealing Free Food Products—always fresh—such as Coffee, Teas, Spices, Flavoring Extracts, delicious time-saving preparations for Pies and Puddings, Household Necessities such as Soaps, Shampoos, Tooth Paste, Shaving Cream, Polishes, Cleaners, etc.; also Home Medicines and many more products. Every package and container is so tempting, and so plainly bears the stamp of quality, that the products practically sell themselves.

I'LL FINANCE YOU

Through my liberal credit plan, once you start, you can do business on any basis! Under this plan, I'll ship your orders on credit, give you ample time to make deliveries to your customers, pocket your own profits and only then pay me my share of the money!

PART-TIME PROFITS

I number among my dealers many housewives, teachers, ministers, farmers and others who devote only their part time. Many dealers started on their regular occupations to devote full time to this selected business in which they are their own boss!

TRY MY PLAN FOR 30 DAYS WITHOUT RISKING A CENT

Order my plan, without your risking a penny, you can live the life of a local authorized dealer, pick up orders from housewives in your neighborhood and pocket the large cash profits. You will have 30 days to prove to yourself how thrilling it is to

make big money, be your own boss, free and independent. If you are not entirely satisfied with the business and its money-making possibilities, I guarantee that you won't be out a penny!



FORDS GIVEN AS BONUS

Loyal, producing dealers are given, as a bonus, a brand-new Ford Tudor Sedan. Or if they already have a car, they are given a cash bonus of \$500.00. This bonus is awarded over and above their own cash earnings. Think what a brand-new Ford car would mean to you for both business and pleasure. Or, if you prefer the cash that \$500.00 bonus amounts to nearly \$10.00 extra cash each week for a whole year, I have already given hundreds of my dealers this big bonus of a Ford car, or \$500.00 cash, and I expect to give it to hundreds more. Why should not one of those dealers be you?

AMAZING MONEY-MAKING OUTFIT

The big Display Outfit that I send you is so complete, so attractive, and such a big help, that you will be amazed to see how simple it is to make money in this fascinating business of your own. This Outfit contains a large assortment of full-size packages of the most popular products in the line—also my simple, "Sure-Fire" Dealer Plan which you can so easily follow that that you need no previous experience or special training. You will also receive free samples and advertising matter to give away; and a big, beautifully illustrated Display Catalog which pictures and describes in a most tempting way every one of the more than 250 quality products in the line. Merely showing housewives this catalog has brought many big orders and free cash profits!

SEND FOR FREE FACTS

By all means send for my complete free facts that tell everything you want to know: all about our great nation-wide organization; all about our pure food kitchens and laboratories; all about our up-to-the-minute manufacturing and selling methods. Then you can also read the letters from other men and women, just like yourself, who took hold of this wonderful business and have since reported splendid earnings that surprised even themselves! When you read these letters, you'll say: "If others can do so much, why can't I?" Don't miss this wonderful opportunity to make a fine income and be your own boss. Get the free facts. Mail the coupon now.

ALBERT MILLS, President

6503 Monmouth Avenue Cincinnati, Ohio

MAIL TODAY FOR FREE FACTS

MR. ALBERT MILLS, President
6503 Monmouth Ave., Cincinnati, Ohio

Without placing me under any obligation, please send me at once full free facts about how you'll help me own and operate a money-making agency for your nationally known products. Show me how I can make up to \$100.00 in a week, and also send me details of your bonus offer of a new Ford Sedan or \$500.00 Cash.

Name

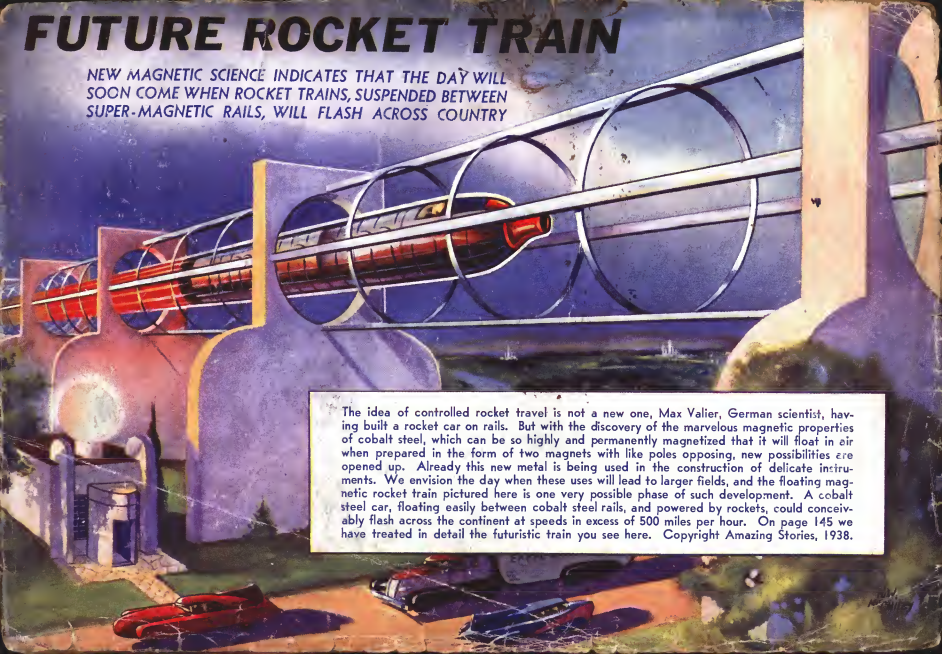
Address

(Please Print or Write Plainly)



FUTURE ROCKET TRAIN

NEW MAGNETIC SCIENCE INDICATES THAT THE DAY WILL SOON COME WHEN ROCKET TRAINS, SUSPENDED BETWEEN SUPER-MAGNETIC RAILS, WILL FLASH ACROSS COUNTRY



The idea of controlled rocket travel is not a new one, Max Valier, German scientist, having built a rocket car on rails. But with the discovery of the marvelous magnetic properties of cobalt steel, which can be so highly and permanently magnetized that it will float in air when prepared in the form of two magnets with like poles opposing, new possibilities are opened up. Already this new metal is being used in the construction of delicate instruments. We envision the day when these uses will lead to larger fields, and the floating magnetic rocket train pictured here is one very possible phase of such development. A cobalt steel car, floating easily between cobalt steel rails, and powered by rockets, could conceivably flash across the continent at speeds in excess of 500 miles per hour. On page 145 we have treated in detail the futuristic train you see here. Copyright Amazing Stories, 1938.